THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XX. No. 487—23RD YEAR.] LONDON, JUNE 6, 1871. [Subscription { 15s. in Advance. / 18s. Credit.] DOUBLE No. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,

Patentees of the Standard Gasometers for the Government, and of the

IMPROVED DRY GAS-METERS.

These Meters are warranted to measure correctly and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured.

To meet the increasing demand, G. GLOVER AND CO. have just entered on possession of extensive premises adjoining their present Works in Ranelagh Road, and they are now prepared to execute promptly, orders to any extent. They keep in stock all sizes of Meters up to 200 lights. In cases of haste, on the receipt of a telegram early on one day, their Meters can be delivered next day in any part of England, and in he large towns in Scotland.

Particulars and lists of prices forwarded on application to—

RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW;
OR
15, MARKET STREET, MANCHESTER.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOSEPH COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL and CO.,

THE OLD TUBE-WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas-Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam-Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest orders may be executed in a few days.
Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanized Tubes, &c.
N.B.—All goods thoroughly tested before sent out, and warranted.

JOHN BENT & SON,

WET AND DRY GAS-METER AND STREET-LAMP MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.
ESTABLISHED 1830.

All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS,
NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.
London Agents: JAMES LAWRIE & CO.,
63, OLD BROAD STREET, CITY, LONDON.

CANNEL COAL FACTORS.

J. & W. ROMANS, of Edinburgh and London, in returning thanks for the confidence hitherto reposed in them, beg to intimate that they have extended their Colliery connexion for the supply of SCOTTISH CANNELS, and have taken a lease of the CROWN WHARF, LIMEHOUSE CUT, LONDON, where these rich Coals can be obtained at the lowest prices.
Messrs. ROMANS, being lessees of several Gas-Works in Scotland, have their Cannels tested in the ordinary working-process-way of gas-making, thus securing for their customers additional guarantee, beyond mere laboratory experiments.
Contracts made to supply any quantity, and analysis sent, on application to the Offices, 53, Frederick Street, EDINBURGH, or 1, Walbrook, Mansion House, LONDON.
Shippers of steam and house Coal, entered on the Government list. Freightage secured on best terms.

LESMAHAGO GAS COAL,

AUCHINHEATH COLLIERY,

LESMAHAGO N.B.

JAMES FERGUSON & CO.

LESSEES SINCE 1832.

LONDON AGENTS:
JAMES LAWRIE & CO.,
63, OLD BROAD STREET, E.C.

CONTINENTAL AGENTS:
LA COUR & WATSON,
LEITH.

CROLL'S DRY GAS-METER,

PRIZE MEDALS
LONDON, 1851;
NEW YORK, 1853;
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON, 1862;
DUBLIN, 1865;
PARIS, 1867.

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON, N.E.

MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."

THE IMPERIAL TUBE COMPANY, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,

GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,

LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.

Twyere Coils for Blast Furnaces, Boring Tubes, Core Bars, Gun-Metal and other Cocks, Boiler Mountings, &c.
HUGHES'S PATENT TAPS FOR HIGH PRESSURES.

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS,

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

For Gas, Steam, Water, &c.

SOLE LICENSEES for the United Kingdom for the LAVENANT PATENT ENAMELLED TUBES & FITTINGS,

the Coating of which does not shell off, is a certain preservative from rust, and resists all effects of expansion and contraction.

LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

LONDON: No. 157, Upper Thames Street, E.C. **LIVERPOOL**: No. 63, Paradise Street. **MANCHESTER**: Barlow's Croft, Chapel Street, Salford. **PARIS and LILLE.**

ECONOMY IN GAS PURIFICATION. A PURER GAS AT LESS COST, AND GREAT SAVING IN LABOUR.

M'DOUGALLS' PRECIPITATED PEROXIDE OF IRON.

The above Oxide is now in use at some of the largest works in the kingdom, and has gained a decided preference, owing to its efficiency, cheapness, and the great saving in labour effected by its use.

It is a pure artificial Hydrated Peroxide, with an addition of only sufficient sawdust to give it the needful lightness or porosity to prevent pressure, and every particle is available for use.

In selecting an oxide, a point more important than its price, is to learn the cost of labour entailed in its use. Whilst at large works the cost of labour for purifying, where lime alone or the natural oxides are employed, is 2d. to 3d. per ton of coals, by the use of the above Oxide it is reduced to 1d. to 1½d., owing to the purifier's working so much longer when charged, and to rapid revivification—two points of special importance in the busy season.

For export to Foreign Works it is unequalled, every particle being available, and saves freight over less concentrated materials.

NOTE.—It is important to note that only the Hydrated Peroxide of Iron is useful, simple oxide being worthless. Inferior oxides show a large per centage of simple oxide, but very little Hydrated Peroxide.

M'DOUGALL BROTHERS,

LONDON—158, LEADENHALL STREET, E.C. MANCHESTER—68, PORT STREET.

E. J. & J. PEARSON,

DELPH & TINTAM ABBEY FIRE-CLAY & BRICK WORKS,

STOURBRIDGE,

PROPRIETORS OF

BEST GLASS-HOUSE POT & CRUCIBLE CLAY;

MANUFACTURERS OF

GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

CAST AND WROUGHT IRON GIRDERS, BRIDGES, AND ROOFS,

STEAM-ENGINE BOILERS, & GENERAL WROUGHT-IRON WORK.

London Agents: PORTER and LANE, 172, FENCHURCH STREET, E.C.

D. BRUCE PEEBLES & CO.,

ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,

BRASSFOUNDERS, & GAS APPARATUS MANUFACTURERS,

FOUNTAINBRIDGE WORKS, EDINBURGH.

SOLE MANUFACTURERS OF

Peebles' Patent Wet and Dry Gas-Meters in Tin-Plate Cases, with Tongue and Groove Joints.

IMPROVED WET METERS IN CAST-IRON CASES.

STATION-METERS, GOVERNORS, EXPERIMENTING METERS, PHOTOMETERS, PRESSURE-GAUGES, &c.

C. & W. WALKER'S GAS-VALVES.

These celebrated Valves of all kinds have been in use for so many years, and are so well known, that a description is unnecessary. They are made of all kinds to suit all the requirements of engineers.

Midland Iron-Works, Donnington, near Newport, Shropshire; 8, Finsbury Circus, London.

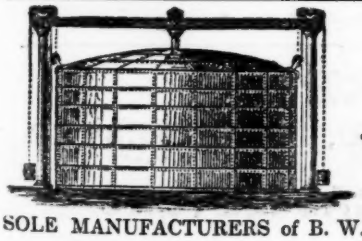
TO GAS COMPANIES, ENGINEERS, AND MACHINISTS.

NEW LUBRICATING OIL.

This Oil is suitable for every kind of machinery, being entirely free from anything liable to produce corrosion, and is equal in lubricating power to sperm or lard oil (though supplied at half the cost).

It is prepared in two consistencies—viz., LIGHT MACHINE OIL, for machinery where the pressure is moderate and the motion rapid. HEAVY MACHINE OIL, on machinery where the motion is comparatively slow. *Four-gallon Samples, carriage free, can included, for £1 1s.*

WALTER CARSON & SONS, Belle Sauvage Yard, Ludgate Hill, London, E.C.; 21, BACHELORS WALK, DUBLIN.



IMPROVED GAS APPARATUS,

FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

ESTIMATES, PLANS, and SPECIFICATIONS PREPARED for BUILDINGS and APPARATUS.

Prospectus, Price Lists, &c., on application.

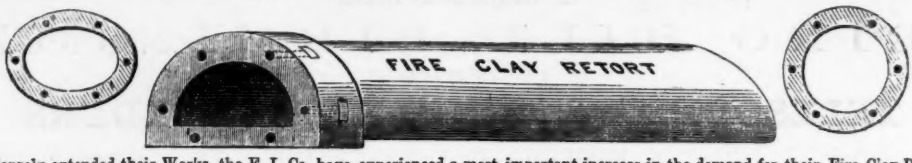
LONDON OFFICES—57, GRACECHURCH STREET, CITY.

*** *Please address letters to Huddersfield.*

REFERENCES TO NEARLY 300 GAS-WORKS.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS.



Since they so largely extended their Works, the F. I. Co. have experienced a most important increase in the demand for their Fire-Clay Retorts, which they owe chiefly to the superior quality of their make, and to the facilities they now possess for executing orders promptly, either for *home* or for *export*.

The Fire-Clay raised from the Farnley Estate (commonly called the Wortley bed) is unsurpassed by any other known in the district, and is peculiarly well adapted for Retorts, Gas-Ovens, and Fire-Bricks; and the F. I. Co. beg especially to invite those connected with Gas-Works, who have not yet used their Retorts, to be good enough to favour them with a trial.

The F. I. Co. generally hold in stock, for immediate supply, FIRE-BRICKS of every size and kind, White Facing Bricks, the White, Buff, and other GLAZED Bricks, in various colours and shapes, now extensively used for *Engine-houses*, Business Premises, as well as for Domestic and Public Buildings.

Prices, Drawings, and all other information may be obtained by applying *as above*; to the

Offices, 3, Westminster Chambers, Victoria Street, S.W.; or to F. Sutton, 46½, Queen Street, Hull.

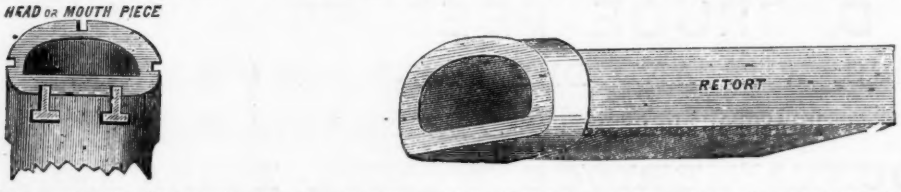
N.B.—The Farnley Iron Company, Limited, give notice that they have the exclusive right of manufacture and sale of

"FRASER'S PATENT RIBBED" FIRE-CLAY RETORTS,

BY SPECIAL AGREEMENT WITH THE PATENTEE.

KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Burs, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge."

Agent in Ireland—Mr. JAMES FURNESS, No. 3, FOWNES STREET, DUBLIN.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large Stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all Sizes kept in London at Mr. ALFRED WILLIAMS, Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

C. & W. WALKER'S

WOOD SIEVES FOR PURIFIERS

Have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

Midland Iron-Works, Donnington, near Newport, Shropshire; 8, Finsbury Circus, London.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

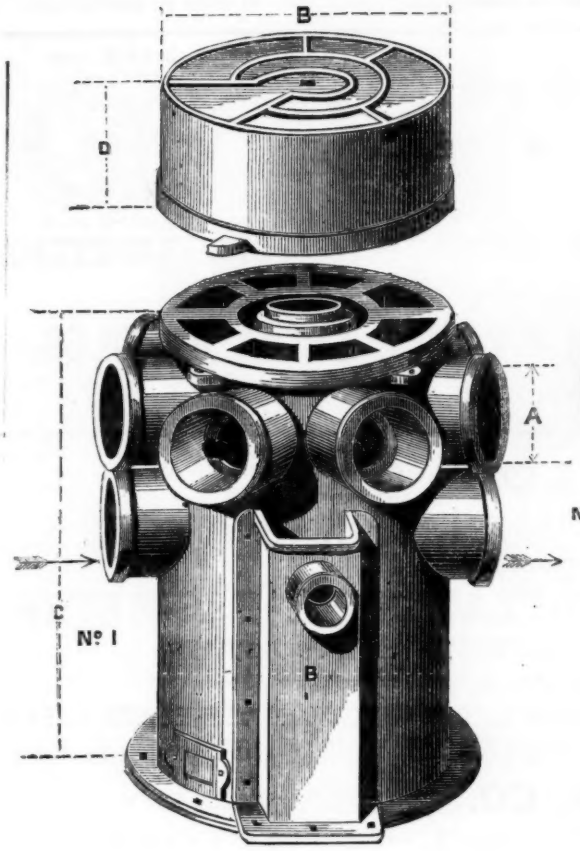
And all kinds of Experimental Gas Apparatus.

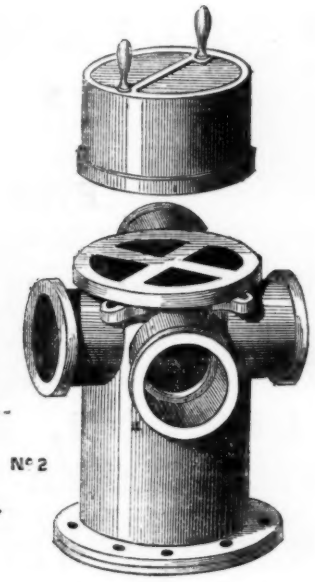
THE THORNCLIFFE IMPROVED CENTRE-VALVE,

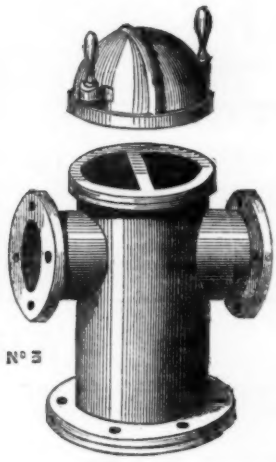
MANUFACTURED BY

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.







Sizes of the

THORNCLIFFE IMPROVED CENTRE-VALVE.

		Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A	Bore of Pipe...	4	5	6	7	8	9	10	12
B	Diam. of Body.	16	20	23	26	28	31	34	40
C	Height of Tank.	33	35	38	43	46	48	51	56
D	Depth of Cover.	8	9	10	11	12	13	14	16
	Total height...	41	44	48	54	58	61	65	72

THORNCLIFFE IMPROVED BYE-PASS VALVE.

SIZES

From 3 ins. upwards.

THORNCLIFFE IMPROVED STOP-VALVE.

SIZES

From 3 ins. upwards.

In all cases the Covers are cast heavy enough to resist any required pressure.

The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

These Valves may be made of any size to suit any position of boxes, to stand any amount of pressure, warranted and tested with gas before leaving the manufactory, prepared to work any number of boxes in rotation—say, two, three, four, five, six, or eight—and for all Valves above 12-inch ports a suitable rack-and-pinion movement is attached if preferred. These Valves (specially arranged) are applicable to inlet or outlet pipes of gasholder, to act as Bye-pass Valves to meters, governors, exhauster, condensers, scrubbers, washers, driers, and duplicate systems of hydraulic main; also to act as Stop-Valves on special mains about the works. Where it is important no impediment be offered to tar or ammoniacal liquor, the same having uninterrupted flow to the general tar-well on the works, and for which purpose the slowly changed, often disordered, and at all times obstructive Slide-Valve (challenging the best of them) is superseded by the exceedingly simple, instantaneously changed Dome-Top Valve, which also carries so marked an index, whether open or shut, at any distance from close observation, providing the Valve can be seen at all. See sketch in perspective, No. 3.

London Office—34, LONDON WALL, MOORGATE STREET, E.C.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

PARIS, 1867.

CLASSES 24 and 53.

WILLIAM SUGG,

GAS ENGINEER.

LONDON, 1862.

CLASSES 13 and 31.

PUBLIC LAMP GOVERNORS, LEVER COCKS, AND POLE LIGHTERS,

LAMP METERS AND BOXES.

LOWE'S JET PHOTOMETERS CAN NOW BE RATED TO 14 CANDLES.

VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

FULLERTON, SON, & CO.,

LONDON ROAD METER-WORKS, EDINBURGH,

SOLE MANUFACTURERS OF

THE PATENT IMPROVED TIN-PLATE DRY GAS-METER,

WITH SPECIAL FACILITIES FOR ADJUSTMENT AND REPAIR,

The principal parts of the mechanism being accessible by the removal of a single Screw.

GAS-METERS on the WET and DRY principles made in CAST-IRON and TIN-PLATE CASES.

STATION-METERS, GOVERNORS, EXPERIMENTAL & TEST METERS, GAS APPARATUS, &c.

LONDON AGENTS: THORNELOE & CO., 34, LONDON WALL CITY, E.C.,

GAS & WATER ENGINEERS, & CONTRACTORS

FOR GAS & WATER WORKS APPARATUS.

SHOW-ROOMS AND WHOLESALE WAREHOUSE FOR

Wrought-Iron Tubes and Fittings for Gas, Water, and Steam; Chandeliers, Pendants, Lamps and Brackets; Plumbers Work, Water-Closets, Pumps, &c.; Lead, Composition, Brass, and Copper Tubes.

METERS SUPPLIED TO ORDER FROM STOCK.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

Analyses by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

Description.	Cubic Feet of Gas per Ton of Coals.	Illuminating Power in Candles.	Coke per Ton of Coal used. Cwt.	Ash in Coke per Cent.	Sulphur in Coa per Cent.
Best Silkstone . .	10,900	17·0	12·8	2·6	1·7
Norfolk Silkstone . .	11,000	15·94	12·5	4·4	1·64
Silkstone Brights . .	11,500	14·3	12·6	7·4	1·85
Silkstone Nuts . .	10,800	15·85	12·66	6·0	0·69

NOTE.—The illuminating power of the Gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

OFFICES, 34. LONDON WALL, CITY, E.C.

TANGYE BROTHERS & HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.;

And BIRMINGHAM (TANGYE BROS.), CORNWALL WORKS, SOHO.

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS.

Over 1000 of the Patent Retort-Lids and fastenings already supplied to the great works of The Gas Company at Beckton.

Several hundreds in use at the works of the London Gas Company.

FIG. 1.

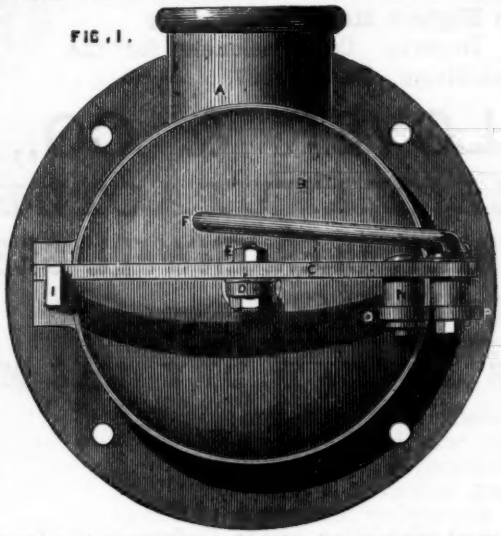
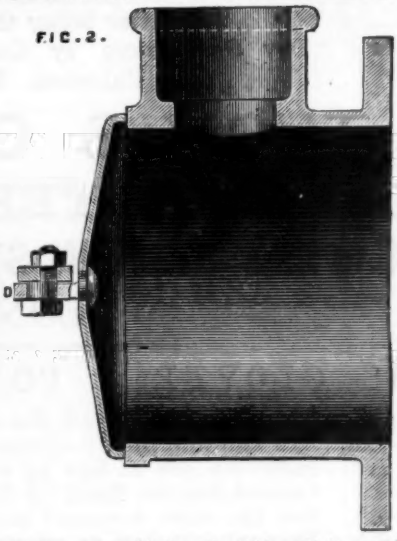


FIG. 2.



Adopted in the Gas-Works at

LIVERPOOL,
DUBLIN,
NOTTINGHAM,
ST. ALBANS,
BURSLEM,
BOURNEMOUTH,
WINDSOR,
BOSTON,
&c., &c.

The expensive and cumbersome process of sealing the mouths of Gas-Retorts by means of luting the Lids with lime and other materials hitherto used for that purpose, is henceforth rendered unnecessary, and will be superseded by the very efficient method shown in the accompanying illustrations.

The Self-Sealing Lid reduces labour, saves wear and tear, obviates all the inconvenience and discomfort consequent on the preparation of luting, and effects a great reduction in the working expenses. The cost attending the process of "luting" in several large gas-works exceeds £1000 per annum, ranging in various works from 20s. to 35s. per mouthpiece.

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The "SPECIAL" Steam-Pump is adapted for all ordinary purposes for which Steam-driven Pumps are used. It is economical in first cost, occupies very little space, and the wear and tear is reduced to a minimum, because there is absolutely no extraneous gear.

REQUIRES NO SHAFTING, GEARING, RIGGERS, OR BELTS.

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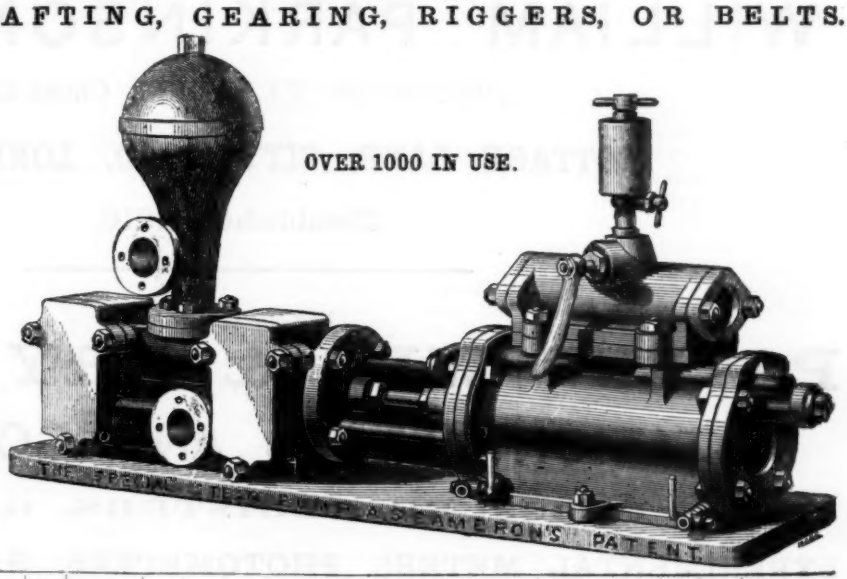
Aylesbury Gaslight and Coke Company.
Alliance and Dublin Gas Company.
Bolton Gas-Works.
Burslem and Tunstall Gas Company.
Brighton Gaslight and Coke Company.
Bury St. Edmund's Gas Company.
Burnley Gas Company.
Bradford Gaslight Company.
Corporation Gas-Works, Stockton.
Chartered Gas Company, Westminster.
Cork Gas-Works.
Dewsbury and Batley Gas Company.
Dublin Consumers Gaslight and Coke Company.
Dunstable Gas-Works.
Imperial Gas-Works, St. Pancras.
Ipswich Gas-Works.
Kingston-upon-Hull Gaslight Company.
London Gaslight Company, Nine Elms.
Lewes Gas-Works.
Louth Gas Company.
Middlesbro' Gas-Works.
Northampton Gas Company.
Phœnix Gas-Works, London.
Richmond Gas Company.
Rio de Janeiro Gas Company.
Reading Gas-Works.
Shipley Gas-Works, near Bradford.
St. Albans Gas-Works.
Sutton, Southcote, and Drypool Gas Company, Hull.
St. Helen's Gas Company, Lancashire.
Windsor Royal Gaslight Company.
Wandsworth and Putney Gas Company.
Woolwich Equitable Gas Company.
Western Gas-Works, Kensal Green.



Diameter of Steam Cylinder . . .	In.	2¼	3	3	4	4	4	6	6	6	7	7	7	8	8	8	8	10	10	12
Diameter of Water Cylinder . .	In.	1¼	1	3	2	3	4		4	6	5	6	7	4	6	7	8	6	7	8
PRICE		£10	£15	£22 10	£20	£27 10	£35	£30	£40	£47 10	£50	£52 10	£57 10	£50	£55	£65	£85	£70	£80	£100

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 6, 1871.

Notes upon Passing Events.

THE party who are for ever endeavouring to persuade the inhabitants of London to resort to a supply of soft water, abusing the metropolitan water companies, and trying to alarm us with frightful stories of the dangers attending the use of the present supply, have found an advocate in the House of Commons in the person of Mr. Kay-Shuttleworth, the member for Hastings. The speech of this gentleman, fully reported in another place, is pre-eminently that of a pleader who states his own case with much skill and some exaggeration, but who prudently suppresses or sneers at any testimony that can be brought on the other side. Mr. Shuttleworth has gone through the evidence taken before the Royal Commission on Water Supply, and carefully gathered from it all that could be set forth in a bill of indictment against the London companies. He fully adopts the alarming and exaggerated statements of the Registrar-General, Mr. Simon, and Dr. Frankland, and takes no heed of direct evidence which disproves or shows the groundlessness of them. Thus, with reference to the cholera outbreaks on the south side of the Thames in 1854, he repeats the story that the great mortality was confined to the tenants of one water company, when it has been stated by the engineers of the two companies that the mains lying side by side had been so indiscriminately tapped by both, that no one knew, until a revision of the district was subsequently made, which company supplied the houses with water. So, with regard to the outbreak at the East-end in 1866, he adopts Mr. Simon's opinion that it was caused by the water from the Old Ford reservoir, and repeats the assertion that the high mortality was restricted to the localities supplied from that source. But this is the very reverse of the truth. The infected districts had a mixed supply, while those to which the supposed cholera-poisoned water, and that alone, was supplied, were perfectly free from the disease except one low neighbourhood towards the end of the epidemic. Now, as Mr. Kay-Shuttleworth is a very young man, he must excuse us for telling him that this line of proceeding, however excellent when adopted by a counsel for the prosecution, is utterly unworthy of a legislator. What is proper at the Old Bailey is quite out of place in the House of Commons. Nothing, in fact, could be more indecent than the contemptuous rejection of Dr. Letheby's evidence on the opposite side, on the score of his receiving payment from some of the companies for his analyses. Are we to understand that a scientific man's opinions are worthless because he is paid for his services. If so, let us look to the consequences. Dr. Frankland is not a paid analyst of the London water companies; and his reports are a scarcely mitigated condemnation of their supply. In his last report, for instance, we find it recorded —with the obvious intention to disgust us—that the waters of certain companies contained moving organisms visible to the eye. But Dr. Frankland happens just now to be the paid analyst of the Edinburgh Town Council, who have a scheme for supplying that city with water from St. Mary's Loch. Now this water happens in certain seasons to be full of moving organisms, visible to the eye, in the shape of water fleas (indicative, we may say, of much other contamination); but Dr. Frankland states that there is no harm in them whatever, that he knows of. He was, too, we believe, the paid analyst of the Manchester Corporation; and he adds that the water supplied to that city often contains these animalcules, and yet is justly considered one of the best waters in the kingdom.

Again, we have before us the copy of a report from Captain Tyler to the Board of Trade, on the water supplied by the Southwark and Vauxhall Water Company. The part which Captain Tyler plays in this report is insignificant enough. Practically, he confines himself to a repetition of the evidence he took from Dr. Frankland, and among this we find the extraordinary statement that the water of this company undergoes some deterioration from coming in contact with the decaying hemp with which the pipe-joints are caulked. Now it does seem most remarkable that a deleterious effect should be ascribed to the 140 square feet of decaying hemp which are to be found between Hampton and Wandsworth, while none is attributed to the acres upon acres of decaying vegetable matter in the shape of peat to which the water gathered in St. Mary's Loch is exposed. But, as we have said, Dr. Frankland is not the paid analyst of the London water companies, but is the paid analyst of the Edinburgh Town Commissioners. And yet it certainly does seem extraordinary, if not inexplicable, that he should condemn the use of hemp for caulking the pipes of a London company, and agree with the Edinburgh Town Council in the excellence of brown water from a boggy district.

But we suppose it is mainly on the ground of its softness that Dr. Frankland recommends the water of St. Mary's Loch, and it is also a soft, or softened, water which Mr. Shuttleworth advocates for London. In the report of Captain Tyler, to which we have just referred, Dr. Frankland advises the application of Clark's softening process to Thames water. Now Mr. Kay-Shuttleworth is eloquent on the waste of soap (much exaggerated), and almost tearful on the rapid destruction of shirts, which comes of the use of hard water, but he has not a word to say on the relative fitness of a hard and a soft water for human consumption. And yet we cannot help thinking that this is a far more important matter than the waste of soap. It is a matter which has not yet received the attention it deserves; but much valuable information has been gathered on the subject. As Mr. Shuttleworth rejects *in toto* the evidence of Dr. Letheby, we strongly commend to his attention a collection of letters, contributed to the *Scotsman*, by Dr. Charles

Wilson, an eminent physician in Edinburgh, during the late water controversy in that city. Dr. Wilson, we may say at once, has adopted the conclusions of Dr. Letheby, but has considerably extended the observations on which they are grounded. He gives us a list of 65 towns, with their death-rates, and the hardness of the water supplied to them. We have now no space for this list, but we give a summary abstract of the tables, in which the towns are classified according to the degrees of hardness of water supply:—

Degrees of Hardness of Water.	Average Death-Rate per 1000 of Population.	Average Degree of Hardness.
Over 10 ..	21·9 ..	16
10 to 6 ..	24·9 ..	8
6 to 2 ..	26·3 ..	3·8
2 and under ..	28·5 ..	1·3

These lists include towns placed under every variety of conditions. There is but one thing comparable among them, and that is the quality of the water supply; and nothing can be clearer than that the death-rate increases just as the hardness of the water supplied decreases. It may be too early, perhaps, to assert that water is the sole cause of a high or low death-rate, for we have had but a short experience of the effects of a soft water supply in large towns. But we have had a long experience of the use of different qualities of water all over the kingdom; and it is quite reasonable to ask if any differences have been observed in living men and animals under the use of hard and soft waters. The answer is given by Dr. Beddoe, from whom Dr. Wilson quotes the fact that, "in "Scotland, the borderers, in general, equal or surpass the average "in the country both in height and weight; while the borderers "on the English side have a still more unequivocal advantage "over their countrymen. These men live, not on the gneiss or "granite, nor the slates giving rise to soft water, but over the "lime of the coal formation, with the shales, and marls, and "magnesian limestones of the sandstone formation; and the waters "they drink are hard, those of Berwickshire and Roxburghshire "thickly incrusting housewives kettles. Over the abundant lime-"stones of Yorkshire the men are among the tallest in England, and "Dr. Beddoe specially instances here the inhabitants around Rich-"mond and in Swaledale. The average of Berwickshire is actually "an inch and a half above that of Aberbeen; while, as to Cumber-"land, Dr. Beddoe gives to it, excluding Carlisle, an average of an "inch below Berwickshire, and half an inch above Aberdeen." These statements, we may say, are made on the strength of a wide series of measurements taken in all parts of the country. And as with man so with beasts. Our finest breeds of cattle have originated in the hard-water tracts of Lincoln, Leicester, York, Durham, and Northumberland. Our finest horses, too, come from hard-water districts; "while, among the gneiss of Shetland "and the Grampians and the slates of Wales and Cumberland, "we have the diminutive Welsh and Highland sheep, the Herd-"wicks, the kylo, and the pony as the characteristic indigenous "races." Here, at all events, is some food for reflection before we soften our water or go to a mountainous district for a supply. It is scarcely worth while to expend 20 millions, or even to spend £66,000 a year, to save some soap and a few shirts, when we run the risk, at the same time, of reducing our population in numbers and *physique*. Let Mr. Kay-Shuttleworth well consider this before he again delivers himself on the subject of a water supply, and not exhibit himself as the spokesman of a party who have much to gain and nothing to lose by a change in the metropolitan supply.

On all other points, we believe, Mr. Shuttleworth was sufficiently answered by the speakers who followed him. He will have learned that the majority of householders of London regard the project to give them a constant supply of water with dismay rather than favour. The metropolitan members are unanimous in their opposition to the Metropolis Water Bill, with the exception, we ought to say, of Mr. Ayrton, who can hardly be regarded as a metropolitan member, and who is never likely to sit again for a metropolitan borough.

The Government have been as unfortunate with their Metropolis Water Bill as with the Gas-Works Clauses Act Amendment Bill. In each case a Bill No. 2 has been introduced, in which no obnoxious confiscation clause appears, Mr. Bruce, as regards the Water Bill, having come to the sensible conclusion that there is no public body in the metropolis who could be trusted with the management of a water supply. The other provisions of Bill No. 2 do not greatly differ from those of Bill No. 1, which will be found in our number for February 28. The Bill is to be referred to a "hybrid" committee, who will hear evidence for and against the measure. They will learn that while there is a general desire that very poor localities should be supplied on the constant system, with which the companies readily agree, there is a strong objection on the part of a vast majority of the ratepayers to have the change made universal.

Circular to Gas Companies.

The Gas-Works Clauses Act (1847) Amendment Bill has passed the committee of the House of Commons, with a few alterations, principally of a verbal nature; and was to have been read a third time on the 2nd inst., but was delayed by a count-out. The most important amendment made in committee, in addition to those mentioned in our last, has been the introduction of a new clause, suggested by the Gas and Water Companies Association, for preventing the connexion or disconnexion of meters without notice being given to the undertakers. The new clause is as follows:—"No consumer shall connect any meter with any pipe "through which gas is supplied by the undertakers to such meter, "or disconnect any meter with any such pipe, unless he shall "have given to the undertakers not less than twenty-four hours "notice in writing of his intention so to do; and, if any person "acts in contravention of this section, he shall be liable for each "offence to a penalty not exceeding forty shillings." The Board of Trade remained firm in their determination to require the deposit of accounts in the forms prescribed in the schedule to the Bill; but they have consented to an addition to the clause giving them power, with the consent of the undertakers, to "alter the said "forms for the purpose of adapting them to the circumstances of "the undertaking, or of better carrying into effect the objects of "this section."

The Bill as so altered will probably become law; and we may now call attention to the changes which have been made since Bill No. 1 was introduced to the House of Commons. In the first place the clause repealing sections 16, 17, 30–38, both inclusive, relating to reserve-fund and dividends, and giving companies power to stop the supply of gas when customers refuse to pay for it, does not exist in the new Bill, which now simply says that "the Gas-Works Clauses Act, 1847, and this Act, shall be "construed as one, and the provisions of this Act shall be held "to repeal and supersede such of the provisions of that Act as "are inconsistent with this Act." But as no mention is made in this Act of dividends and reserve-fund, the provisions of the Act of 1847 relating to them of course remain in force. Next we find the altogether objectionable clause limiting the price of gas, and providing for a revision of price every five years, and giving to the Board of Trade powers to make inquiries at the expense of the undertakers and fix a maximum price, omitted in the Bill now before the House. Further, it is arranged in the present Bill that the price charged to local authorities for the supply of public lamps shall be settled by agreement, or by arbitration, regard being had to the circumstances of the case, and the price charged to private consumers, which is a very different thing to enacting that the price shall be the lowest charged to private consumers in the district. Next, we are happy to say that the clause requiring maps of the limits of an undertaking, showing the lines and depths of the mains, &c., and many other things which would have entailed great expense on small companies, does not appear in this Bill. We are glad to say, also, that the clause relating to the testing of gas is so far altered that now the gas is only to be tested for its illuminating power, and to ascertain the absence of sulphuretted hydrogen. A further amendment ought to have been made, fixing the *locale* of the testing-place at the works of the undertakers, but this has not been agreed to, and the position of the testing-place is left a matter for arrangement. Another obnoxious clause has been withdrawn, which would have given the Board of Trade power to appoint an inspector to make additional testings at the request of local authorities or several consumers. The alteration with regard to the keeping and deposit of accounts we have already mentioned. The gain by this alteration, it may be, will not be great; but, at all events, it leaves room for remonstrance from companies under peculiar circumstances. But, perhaps, the greatest triumph of the opposition is, procuring the complete withdrawal of the clause which would have given local authorities the power to effect a compulsory purchase of gas undertakings within a limited period. This clause was utterly indefensible; but just now the transfer of gas undertakings to local authorities is greatly favoured in official quarters, and gross as might have been the injustice inflicted by the operation of this clause, we are almost surprised that the Board of Trade gave it up so readily. Beyond this, we need only now notice some verbal alterations in a clause standing No. 26 in Bill No. 2, and 32 in No. 1, which strengthens the hands of companies in preventing and punishing fraud when consumers tamper with meters or provide means for the abstraction of gas without measurement. By these alterations the Bill is reduced to a comparatively harmless measure; and although its provisions cannot even now be regarded as perfectly satisfactory, we may congratulate gas companies on the success which has attended the opposition of the Gas and Water Companies Association, in deference to whose remonstrances the amendments have been made.

The Gas and Water Provisional Orders Confirmation Bill is

passing through its stages unopposed, except in respect of the Birkdale Gas Order, against which a petition was presented by the Southport Corporation, but was subsequently withdrawn.

We may here call attention to the approaching meeting of the British Association of Gas Managers, which is to be held at Dublin on the 13th inst. The rapid progress the association has made is a convincing proof that the advantages it offers to the members are fully appreciated by gas managers. The meeting at Dublin promises to be as interesting and useful as any previous gathering. The list of papers embraces a variety of topics, every one of great practical interest to those who have the management of gas-works, and much must be learnt from the free exchange of opinion on the several subjects opened for discussion. In addition to the papers, a lecture is promised by Dr. Letheby, "On the Analysis of Gas," which cannot fail to be especially useful to the members who are not practical chemists.

We append the list of papers and communications to be submitted to the meeting:—The "Lithology of Gas Coals," by Mr. Jas. Paterson, Warrington; "On the best Form of Condenser," by Mr. W. J. Warner, South Shields; "On a new Equilibrium "Gas-Governor," by Mr. Chas. Hunt, London; "On the "Economy of employing Exhausters," by Mr. Geo. Anderson, London; "On the Apparatus for and Method of Manufacturing "Sulphate of Ammonia, suitable for small Works," by Mr. Jas. Eldridge, Richmond; "On the Cause and Prevention of Choked "Ascension-Pipes," by Mr. John Somerville; "On Carbonizing "Accounts," by Mr. W. J. Warner, South Shields, and by Mr. John Niven, Clayton; "On Coal Storeage and Spontaneous "Combustion of Coals," by Mr. A. H. Wood, Hastings, and "On Spontaneous Combustion in Coal-Stores," by Mr. A. C. Fraser, Middlesborough; "On Gas Measurement," by Mr. F. W. Hartley, London; "On the Manufacture of Gas from Coal Tar," by Mr. J. Arnott, Leeds; and "On Additional Experience of Tar "Pavement," by Mr. Geo. Anderson, London.

A correspondent inquires whether any arrangement is in existence, or whether any attempt has ever been made towards forming a mutual insurance association by gas companies, for the insurance of each other's property against losses arising from explosions. No such association is in existence, and no attempt, we believe, has ever been made towards forming one. But we have heard the matter discussed; and the conclusion come to was that any such combination would tend to diminish the vigilance of the servants and officers of gas companies, and that it would be better to leave the matter on its present footing.

Another town in our Eastern possessions will soon be added to the number of those which already enjoy the benefit of being lighted by gas. The gas-works of the Colombo (Ceylon) Gas and Water Company, we understand, are so far advanced that it is expected gas will be delivered by the end of August next. Considerable difficulties have been encountered in laying the foundations of the buildings, and especially of the gasholder, the site selected for the works being, unfortunately, a plot of marshy land. All the difficulties, however, have been overcome, and now the works above ground are progressing at a rapid rate. It is interesting to read that native Cingalese mechanics and pipe-layers, specially trained by an English foreman, are doing their work well; and that great energy has been displayed by both engineer and contractor is proved by the fact that the ground was first broken only on the 9th of January last, and the first portion of the plant arrived out no earlier than the 4th of February. Undertakings such as this and the railway, which has proved such a success in Ceylon, probably do more to strengthen our power over the native population than any display of military force we may make.

The death is announced of Mr. John Maughan, the chairman of the Leamington Priors Gas Company, and a director of the Chartered, and Brighton and Hove Gas Companies, and largely otherwise interested in gas property. Mr. Maughan took a lively interest in the Gas and Water Companies Association, and the success which has attended their opposition to the Gas-Works Clauses Act (1847) Amendment Bill was in a great measure due to his activity. He died, after a short illness, on the 31st ult., at the Station Hotel, York, aged 69.

Correspondence.

FORCING AND WASHING GAS BY STEAM.

Sir,—Noticing in your last issue a description of a patented mode of exhausting and scrubbing gas by the direct action of steam, I desire to state that by direction of Mr. Croll, whose manager I was, at one of his gas-works, 23 years ago, I applied a jet of steam in the condenser, and it removed a considerable portion of the sulphuretted hydrogen, the steam, condensed into water, being quite black. It also made the gas nice and moist for its passage through the dry lime purifiers, and caused these to do their work with a minimum quantity of lime. It likewise caused the condenser to get stopped up with very thick tar; and we had very considerable quantities of water collect in the purifiers and syphons on the works, and it was abandoned. I have often, however, thought that otherwise applied we might send in the exhaust steam from our engines to assist in purifying the gas; and I should feel myself at liberty to do so without infringing any one's patent right.

As a matter of practice it will be interesting to know whether steam blown into a gas-pipe will form a vacuum as economically as when sent into the cylinder of a steam-engine, in connexion with a good exhauster. At present I am inclined to venture "No;" but experiment is the best way to decide yea or nay; and I am sure readers of the Journal will be glad to have the economical results placed before them.

George Anderson.

London, June 1, 1871.

THE RELATION OF LIGHT TO CONSUMPTION IN GAS-BURNERS.

Sir,—I am very pleased that Dr. Pole has, for the second time during the course of this discussion, thought my experiments deserving his attention, and I beg to thank him for his courtesy, and for the fairness of his criticisms.

Comparisons depend very much for their value upon the manner in which they are made. That which Dr. Pole has instituted to illustrate the superiority of Bunsen's law as applied to my cannel burner experiments lacks one essential condition—namely, equality of terms; being based upon a purely arbitrary definition of what constitutes the whole range of a burner. I, therefore, take the liberty of offering for acceptance the following, in which the respective limits of operation of the two systems are strictly adhered to. It will be seen that the old rule has nothing to fear from such a comparison:—

No. 5.—Standard Cannel Burner.

Consumption per Hour. Cubic Feet.	Illuminating Power. Sperm Candles.	Illu. Power according to R. of Three. Value of 1 Ft. = 4·84 Cand.	Per Centage of Error.	Illu. Power according to Bunsen's Law, as given by Mr. Pole.	Per Centage of Error.
8·75	41·6	42·3	1·7	..	..
8·14	39·9	39·4	1·3	39·9	0·0
7·91	38·3	38·3	0·0	38·9	1·5
7·25	35·1	35·1	0·0	35·4	0·8
6·41	31·2	31·0	0·6	31·0	0·6
5·83	28·3	28·2	0·3	28·0	1·0
5·28	25·4	25·5	0·4	25·0	1·5
4·58	21·0	..	..	21·4	1·9
3·90	18·1	..	..	17·8	1·6
3·22	15·2	..	..	14·2	6·6
2·58	10·6	..	..	10·9	2·3
Mean per centage of error . .			0·6		1·3

No. 6.—Same Burner.

Value of 1 Foot by Direct Proportion = 6·82 Candles.

8·68	58·3	59·2	1·5	..	..
7·88	53·5	53·7	0·4	..	..
7·52	51·2	51·3	0·2	..	..
6·86	46·8	46·8	0·0	46·8	0·0
6·28	43·1	42·8	0·7	42·5	1·4
5·50	37·8	37·5	0·8	36·9	2·4
4·85	32·7	33·1	1·2	32·0	2·1
4·24	27·7	..	..	27·6	0·3
3·06	18·2	..	..	18·8	3·3
1·49	7·1	..	..	7·3	2·8
Mean per centage of error . .			0·7		1·7

I do not know why Dr. Pole should include the worst results, while excluding some of the best from the operation of his theorem. What is a burner but an exponent of illuminating power, and its range, if not the limits of satisfactory performance of its function? The great merit of the direct proportion method is that it defines the limits of profitable luminous combustion; and this is surely a condition which should govern the use of every burner.

June 1, 1871.

Charles Hunt.

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, May 22, 1871.

The Greenock Police, Improvement, and Gas Bill was read a third time, with the amendments, passed, and sent to the Commons.

The Lincoln Water Bill.—The Queen's Consent was signified, and the Bill reported, with amendments.

The Glasgow Corporation Gas Bill was returned from the Commons, agreed to.

A petition was deposited against the Liverpool Improvement and Water Bill, from J. S. Leigh.

Tuesday, May 23.

The Bromsgrove and Droitwich Water Bill was read a second time, and committed.

The Lincoln Water Bill was read a third time, passed, and sent to the Commons.

The Ilkley Local Board Bill was read a third time, with the amendments, passed, and sent to the Commons.

The Arbroath Corporation Gas; Dundee Water; Forfar Gas; Perth Gas; and Salford Borough Drainage and Improvement Bills, were brought from the Commons, and read a first time.

THURSDAY, MAY 25.

The following Bills received the Royal Assent:—ILKLEY GAS; BOSTON GAS; LOUTH WATER; CRADLEY HEATH GAS; SUTTON AND CHEAM WATER; WESTHOUGHTON GAS; RHYL DISTRICT WATER; FOLKESTONE WATER; HUDDERSFIELD WATER; DUNSTABLE GAS AND WATER; and GLASGOW CORPORATION GAS.

The ABERGAVENNY IMPROVEMENT (No. 2); the EDINBURGH AND DISTRICT WATER; and the RICHMOND SEWAGE Bills, were brought from the Commons, and read a first time.

The BATLEY CORPORATION WATER Bill was returned from the Commons, with the amendments agreed to.

A petition was deposited against the LIVERPOOL IMPROVEMENT AND WATER Bill, from the Corporation of Bootle-cum-Linacre.

HOUSE OF COMMONS.

MONDAY, MAY 22, 1871.

The BATLEY CORPORATION GAS BILL.—The Lords amendments were agreed to.

The DUNDEE WATER; FORFAR GAS; PERTH GAS; and SALFORD BOROUGH DRAINAGE AND IMPROVEMENT Bills, were read a third time, and passed.

The ABERGAVENNY IMPROVEMENT (No. 2) Bill, as amended, was considered, and an amendment made.

The EDINBURGH AND DISTRICT WATER Bill, as amended, was considered.

A petition was deposited against the NEWRY BOROUGH IMPROVEMENT AND WATER SUPPLY Bill, from the inhabitants of Newry.

METROPOLIS WATER SUPPLY.

Mr. KAY-SHUTTLEWORTH: I rise to bring before the House the reports which have been presented by two Royal Commissions,—the commission appointed in 1866 on water supply, and presided over by the Duke of Richmond, and the commission appointed in 1868 to inquire into the best means of preventing the pollution of rivers. There is much in the report of the latter commission which will hereafter deserve the special and attentive consideration of the House, and I propose on this occasion to confine myself exclusively to those parts of the reports which have an especial bearing upon the motion which I shall have the honour to submit—"That in the opinion of this House the water supplied to householders in London should be derived from pure sources, and should be delivered on the constant system." I suppose no one will deny that hardly any subject could engage the attention of the House of greater importance, not only to this metropolis, but to the country generally. We are all deeply concerned in the supply of a sufficient quantity of pure and wholesome water to the inhabitants of our capital. Whether we are inhabitants of London, whether we are only occasionally residents in London, or whether we are, as members of this House, responsible to the ratepayers of London, it seems to me that the supply of pure and wholesome water is a subject of the deepest interest to us. I would say more. I do not believe there is a man or a woman in the country who is not deeply concerned in everything that relates to the health of this metropolis, for if London is in a good sanitary state, so much the better for the whole country; but if by any misfortune the state of London should become physically impaired or morally debased, we need only look to the misfortunes of a sister capital not far from us to judge how calamitous such an event would be to the whole nation. The subject to which I desire to draw the attention of the House is but a part of the great problem of sanitary reform of the whole country; and now that we have, by the legislation of the first half of the present century, given to the people of this country political and commercial freedom, and a system of national education, I think that no subject deserves a larger share of the thoughts of members of Parliament than the subject of sanitary reform. We are told by a high medical authority, Dr. Simon, the medical officer of the Privy Council, that there are no less than 100,000 preventible deaths in this country in the course of a year, and if we are entrusted with the knowledge how these deaths may be prevented, I venture to assert, without fear of contradiction, that we, as members of the Legislature, may be held in a great degree responsible for that loss of life. In that sense it is that I desire to bring under the notice of the House the serious considerations involved in the matter in justification of my motion. Her Majesty's Government at the commencement of the session introduced a bill for the purpose of amending and enlarging the Metropolis Water Act of 1852. My honourable friend, the member for the Universities of Edinburgh and St. Andrews, who will second my motion, has undertaken, as a sort of division of labour, the consideration of that bill so far as it relates to the motion; and therefore I will only make one or two passing observations upon it before I proceed with the points which I decide to submit. The bill seems to me to deal with the subject in a very incomplete and unsatisfactory manner, and I am sorry to have to say this of a measure which my honourable friend, the Secretary to the Admiralty, took a very prominent part in preparing.

Mr. CRAUFURD: I rise to order. I want to know whether it is competent to the honourable member, on his motion, to discuss a measure which stands on the paper as an order of the day to be discussed on a future occasion.

The SPEAKER: It is not competent, of course, for an honourable member to enter into the consideration of the provisions of a bill which will come before the House at a future period.

Mr. KAY-SHUTTLEWORTH: My honurable friend assumes that I was going into a discussion of the bill. I have already stated that that was not my intention. The Metropolis Water Bill relates to the larger subject of my motion, and with great deference to you, sir, I believe I shall be perfectly in order in the remarks I am about to make. I extremely regret to have to say that the bill introduced by the Government, which my honourable friend, the Secretary to the Admiralty, had so large a share in preparing, is incomplete and unsatisfactory, and it is on account of its incompleteness and unsatisfactoriness that I desired in any discussion that might take place upon the bill to raise a larger and wider question as to whether we should not go to purer sources for our supply of water, and various other questions which are not affected by this bill. But the bill has been repeatedly put down for late hours on Government nights, and there seemed no prospect at all of entering into a discussion of the larger question. Therefore, a month ago I ventured upon the course of giving notice of the motion which now stands in my name, in order that I might ask the House not to tinker with the present system of water supply, but rather to follow the example, not only of our modern cities and towns, but even of ancient Rome and the great cities of Italy in ancient days, when they went to distances comparatively great in order to ensure for their large populations the inestimable advantage of pure water. My first duty is to convince the House that our present supply is derived from polluted sources, that it is always suspicious, and sometimes absolutely dangerous in character. I shall have to plague the House a little, no doubt; for, from the nature of the case with which I have to deal, it will be very difficult to make this question of the water supply other than a dry subject. I shall also have to dwell on many unsavoury topics, for my object is to disgust the House, the country, and the ratepayers in London with the water now provided. Our supply is chiefly derived from the river Thames. There are two companies, the Kent Water-Works Company and the New River Company, which do not supply that water. The Kent Company's water is altogether drawn from chalk wells south-east of London, and the New River Company's water to a great extent from the chalk springs which form the head waters of the river Lea; and though it is in part taken from the Lea itself, where the river is open to suspicion of contamination, yet on the whole the water supplied by the New River Company and the Kent Company will bear examination. But the East London Company, the Chelsea Company, the West Middlesex Company, and the Grand Junction Company, which supply a large district north of London, and the Lambeth Company, and the Southwark and Vauxhall Company, which supply the south, obtain their water either exclusively from the Thames, or, in the case of the East London Company, from the polluted portion of the river Lea. The Chemical Commission, which consisted of Professors Graham, Miller, and Hofmann, in their report, presented to the Home Office in 1851, when the right honourable gentleman the member for Morpeth was Home Secretary, mentioned the great disadvantages of this water supply in the following order:—first, its fluctuating temperature; secondly, its liability to turbidity from floods, shown by the yellow flood tinge of the Thames, with which we are all acquainted; thirdly, its vegetable discoloration during the autumn, which renders the processes of the laundry very much more difficult; and fourthly, that its source is the main drain of a populous district. I object to such a supply, and could state fearlessly that such water is a great cause of diarrhœa, cholera, and typhus fever. In making that assertion, I will ask permission to support it by quotations from the language of chemical authorities, for I know that everything that falls from myself on the subject cannot carry weight unless it is so supported. In the evidence which Dr. Simon, the medical officer of the Privy Council, gave before the Royal Commission on the Water Supply, I find this passage: The Duke of Richmond asks, "Have you any idea of the outbreaks of cholera in any part of London having been caused by the quality of the water?" To which Mr. Simon replies: "It is, I think, a matter of absolute demonstration that in the old epidemic, when the south side of London suffered so dreadfully from cholera, the great cause of the immense mortality there was the badness of the water supply then distributed to these districts of London. In the interval between the 1849 epidemic and the 1854 epidemic, one of the two companies which supply the south side of London had amended its source of supply—it had gone higher up the river—and we at once lost a great part of the mortality on that side of the river. But it was found that the great difference did not prevail uniformly through the south side of London, but was confined to those houses which were supplied by the improved water supply. There was still great mortality on the south side of the river, but this belonged exclusively to the houses which were still supplied with impure water." He goes on to call this "a gigantic crucial experiment performed on half a million of people," and to give details which show that whilst the cholera death rate per 1000 was greater in 1854 in the houses still supplied with impure water than in 1849 (13 instead of 11·8), in those supplied by the new water it had sunk from 12·5 to 3·7. The pipes of the two companies interlaced each other, and "it is, therefore, to be presumed," say the Rivers Pollution Commissioners, "that all were equally exposed to any other deleterious influences which affected the health of the district at that time, the quality of the water supplied by the two companies constituting, so far as is known, the only difference in the conditions under which the population was placed. In the houses supplied with comparatively pure water the deaths from cholera were 40 per 10,000 of the inmates, whilst in those supplied with foul water the deaths were 130 in 10,000." I have given the House the authority of Mr. Simon and of the Rivers Pollution Commissioners, which comprised amongst its members Dr. Frankland, one of the most eminent chemists of England, and I may say of Europe. But I can give more recent evidence of the assertion I have made that this pollution is a great cause of cholera. I will take the case of the epidemic of 1866, and here I might quote the Registrar-General and Dr. Farr; but in order not to weary the House with quotations, I will simply give what Dr. Simon says on the subject in his evidence before the Royal Commission on Water Supply. He says: "As is now a matter of notoriety, within the area of another water company in London the population last year"—that is, in 1866—"suffered very dreadfully from cholera; I refer to certain eastern parts of London. Cholera in high development was confined to these parts of London, and these parts of London were in the area of one water company. And what makes the case the more remarkable is that not the whole area of that water company suffered; the water company gave two waters, and the high cholera mortality was apparently restricted to those parts of London which received one of these two supplies, so to speak, to half the district of the East London Water Company. The source from which the company supplied this half of its district was a source peculiarly exposed to contamination from a foul part of the river Lea. The contamination was sewage. Speaking broadly for the whole metropolis, the area of intense cholera in 1866 was almost exactly the area of this particular water supply, nearly, if not absolutely, filling it, and scarcely, if at all, reaching beyond it." I know it will be said, in answer to this statement, that the committee, which was presided over by the right honourable gentleman the First Commissioner of Works, made a report which completely whitewashed the East London Water Company. I am not going to bring accusations against the East London Water Company, but I think the combined testimony of the Registrar-General, Dr. Farr, and Dr. Simon, and almost every other medical authority who knows anything about the subject, will outweigh the opinion of this committee. The danger to the population from polluted water is not confined to cholera. Sewage pollution of water produces many other fatal diseases, and we know that typhoid fever especially has been frequently traced to the drinking of polluted water. Professor Parkes, Professor of Military Hygiene in the Army Medical School at Netley, in his evidence to the Royal Commission on Water Supply, speaks of about thirty instances of local outbreaks of severe typhoid fever known to him, which arose from water containing sewage—the disease was communicated by drinking the water. An interesting case occurred at Guildford in 1868, where a high and healthy part of the town was for a single day in August supplied with water out of a particular well. About 500 cases of typhoid fever occurred immediately afterwards, and there were about forty deaths. In all these cases except three the persons striken had on that particular day drunk water from that particular well, and on examination of the water it was found that sewage had made its way into it from a neighbouring sewer. That is very strong evidence, and many more cases might be quoted to show that outbreaks of typhoid fever have been caused by an impure water supply. I have no doubt I shall be answered that the Thames Conservancy Act is going to purify the Thames, and that then these sources of impurity will be removed. But the fact is that, though many years have elapsed since the Thames Conservancy Act was passed, the Thames is now much more polluted than it ever was. The sewage of a population of about a million persons runs into it, and it is impossible to suppose that any legislation we can effect can keep out the sewage altogether. It may be also said that a River Pollution Bill, based on the report of the Royal Commission on the Pollution of Rivers which is now sitting, may be passed, which will mitigate the mischief to a great extent. But, although this legislation is most desirable and most pressing, and though you may make rivers look decently clean, may get rid of smells, and make them so that fish will live in them, yet the Rivers Pollution Commissioners tell us in their first report, page 106, that "no process has been yet devised of cleansing surface water once contaminated with sewage, so as to make it fit for drinking." The sewage of Oxford, Reading, and Windsor may be purified (so to speak) by filtration or irrigation, and admitted into the Thames. But the Rivers Pollution Commission, speaking of this purified sewage, says: "Although this water cannot be used for domestic purposes without great risk to health, it is so bright, colourless, and sparkling, and contains, moreover, such a minute proportion of organic matter, that the most fastidious could not object to its admission into running water." That is their first report; but at page 54 of their third report, which is not yet in the hands of members, they say: "The use, for domestic purposes, of river water to which sewage (even after deodorization or employment in irrigation) gains access, and of that pumped from shallow wells in populous districts, ought to be carefully avoided,

since the analyses which we have made of very numerous samples of water from such sources, in various localities, have rarely failed to reveal in it the presence of organic matter of disgusting origin; and we have proved in our first report (1870) that no possible length of flow in any British river affords any guarantee that such sewage or organic matters have been oxidized and destroyed." And they then go on to use strong language, which, however, under the circumstances, I think I am justified in quoting. They say: "If it be admitted that it is disgusting and dangerous for man to drink water containing his own excremental discharges, it is our deliberate opinion that all water which is intended for domestic purposes should be intercepted either by reservoirs, conduits, or deep wells, before it reaches the beds of sewage-contaminated rivers." The conclusion to which I wish to draw the attention of the House is that we should go either to heads of rivers or to springs from pure sources for our supply, and that we should not go to a river after it has passed through populous towns and been polluted by sewage. I know it will be argued that any sewage that may escape into a river becomes oxygenized by a flow of a dozen miles in the river, and I am aware that Dr. Letheby has given evidence before committees and commissions tending to that conclusion. But I am in a position to enable me to say that Dr. Letheby is not an independent authority. He has for many years been the paid analyst of the water companies, and his evidence must be looked upon as having been given with a certain bias; and, when one finds that it is in direct contradiction to that of great authorities, I think we may safely disregard it. What does Dr. Frankland, in his evidence before the Royal Commission on Water Supply, say? He is asked the following question: "Then you do not accept the theory that sewage travelling down the river is so oxidized, as it passes a distance of six or seven miles, and is so entirely destroyed that its original elements are not to be found, but it is converted into some other substance or substances which are not detrimental to human health?" And he answers, "I believe that that is by no means a generally true proposition. I believe that under favourable circumstances that effect may be produced as far as regards the dead organic matter in the sewage, but not at all as regards the living germs that may be present in that sewage." And if honourable members will take the trouble of referring to the evidence of Sir Benjamin Brodie, the Professor of Chemistry at Oxford University, they will find that he entirely confirms that view. This question was put to him: "You will have observed that we have evidence on both sides, one party alleging that water impregnated with sewage will be purified by the action of the air and oxidation in its course a few miles down the river, but on the contrary Dr. Frankland states very distinctly that water once contaminated with sewage, is unfit for human use, and that you will still find what he calls the skeleton of sewage present, although it may have travelled 100 miles, and been exposed to filtration?" And he replies, "I think what is stated by Dr. Frankland is true that there are no known causes in operation on which we can adequately rely to remove the sewage from the water." And now I shall ask the House to listen once more to the evidence of Dr. Simon. He is asked, "Supposing that sewage is discharged from one of the sewers—say at Windsor—would it be possible to detect the presence of that sewage seven miles lower down the river, having regard to the volume of water in the river?" And he answers, "I believe it would be absolutely impossible for chemists to discover it, but the practical sanitary question is different." Then he is asked, "Supposing tape-worm eggs to be sent into the river with that sewage, would those tape-worm eggs be alive seven miles down, and assuming (which is a frequent pathological opinion) that the respective contagion of typhoid fever and cholera are living germs, would those germs be alive seven miles down?" And he replies, "I cannot say they would not;" and he adds, that he could only detect them by their effects. On being further asked, "Might not the same disease be produced from any other cause?" he replies, "The particular parasite can only come from its particular egg. You would not get hydatids except from eggs, any more than you would get chickens without eggs." Dr. Farr gave similar evidence. Dr. Simon was further asked, "If it is not possible for a chemist to discover sewage, is it not presumptive evidence either that it does not exist, or that, if it does exist, it is in such minute quantities that it is in no way deleterious to human health?" And he replies, "I am very decidedly of opinion that that principle is not a safe one to adopt as a basis of sanitary regulations in the matter. I think the rule ought to be that no sewage should go into any water that can be used for drinking purposes. I think even that allowance should be made for the proper decent taste of people. Water into which sewage has been discharged is, in relation to the matter now under consideration, an experiment on the health of the population, and I do not think that that experiment ought to be tried. I think the drinking of such water is dangerous." Now, sir, we have been trying this dangerous experiment for many years. I ask the House to kindly listen to me some time longer, while I show that we ought not and need not longer continue it. The population of the Thames basin in 1867 exceeded one million persons. Oxford, Reading, and Windsor, and many other towns and villages, drain into the Thames, and whatever may be done by filtration, that water cannot, in my opinion, be made fit to drink. Whatever you may do with the ordinary sewage of a town, supposing I were to admit, which I do not, that you could, by irrigation, deodorization, and purification, render it unobjectionable, yet you could never prevent flood waters which occasionally increase the bulk of the Thames so much, you could never prevent them washing in vast quantities the sewage manure and matter from the land, which would render the Thames water very unfit to be a source of water supply to the metropolis. The Rivers Pollution Commissioners admit that they could not recommend an attempt of that kind. The report of the General Board of Health for 1850 dwells particularly on the turbidity caused in Thames water by floods, a turbidity which common strainers and filters cannot remove; and Mr. Simon, whom I once more quote, in his report of the cholera visitation of 1866, after asserting that an Englishman who contracts cholera may be said with almost absolute certainty to have received it from cholera sewage, says: "And thus it is that my practical advice remains substantially what it has been for years. The local conditions of safety are, above all, these two—first, that by appropriate structural works, all the excremental produce of the population shall be so promptly and so thoroughly removed that the inhabited place, in its air and soil, shall be absolutely without fœcal impurities; and secondly, that the water supply of the population shall be derived from such sources and conveyed in such channels that its contamination by excrement is impossible." And now, sir, I think I have said enough in condemnation of our present system of water supply from the Thames. At all events, that is my case as regards the Thames water. But it will be my duty to offer some alternative plan or plans, whence we may derive a sufficient supply of pure water for our population. Now, the Royal Commission had before it several alternative plans. First of all, there were plans for obtaining the supply from mountainous districts. Mr. Bateman had a plan for bringing a vast supply from North Wales; Messrs. Hemans and Hassard proposed to procure a supply from the lakes of Cumberland and Westmoreland; Mr. Hamilton Fulton had a plan to bring it from the River Wye in Mid Wales, and Mr. Remington proposed to bring it from the hills of Derbyshire. There were also some schemes for obtaining the supply from sources other than mountainous districts. One very serious objection to these plans is that of expense. That of Mr. Bateman would involve an expense of £10,850,000, and there is a serious objection to all of them—namely, that the water would have to be carried in such large open conduits that we should be liable to the stoppage of the supply in frosty weather, and possibly, if ever we should have the misfortune to be at war, and to have an enemy on the soil of England, which is a contingency that Englishmen very seldom contemplate, we should be exposed to the risk of having our water supply for London cut off. I, therefore, dismiss those plans, and especially as there are other sources than mountainous districts from which an excellent supply may be obtained. The water in the chalk round London has been frequently proposed as a source of supply. The chalk strata in the neighbourhood of London is a formation extending over about 2000 square miles. It is stated by the commissioners of 1851 as being 3000 square miles in extent, and they say that the strata varies from 500 feet to 1000 feet in thickness. The Water Supply Commission say: "Almost all the rain falling on the surface is absorbed or percolates through the fissures of the chalk, and so close is its texture that the bulk of the rain takes weeks and months to filter down to the level of the water-line in the interior of the chalk hills, a line the depth of which from the surface of the ground may vary from 100 to 300 feet, according to the height of the hills." Considering the quantity of water which the chalk formation can hold, the House will not be surprised at hearing, on the estimate of an eminent engineer—Mr. Homersham—that there would not be the slightest difficulty in getting 10,000 million gallons a day for the supply of London. Already, I may remark, the towns of Brighton, Croydon, Hull, Portsmouth, Chatham, Gravesend, Canterbury, Winchester, and many other towns, derive their whole supply from the chalk strata, and the Water Supply Commission reported that 200 million gallons a day is the highest demand that need be reasonably looked forward to for the metropolitan supply on the constant system, with a population increased to 5 millions, being only one-fiftieth part of what Mr. Homersham says it will yield. The Royal Commission on Water Supply, in their report of 1869, say: "With natural subterraneous reservoirs extending over above 2000 square miles, a storeage reserve is provided comparatively independent of the seasons, and maintained by the ordinary operations of nature, while no filtration can equal that effected through masses of sand, sandstone, earthy limestone or chalk, from 50 to 300 feet thick. The quantity of mineral matter taken up is, in most cases, moderate, while the really objectionable ingredient—the organic matter—is reduced to a minimum. At the same time, the water is kept at a uniform low temperature, and protected from light and air—conditions unfavourable to the existence of living organisms. Springs from such sources probably represent potable waters in their best state; and amongst the favourable specimens of such waters may be instanced many chalk springs, the water from the lower chalk at Caterham, and some of the springs of the lower greensands of Surrey." It has been urged as a great objection that this water from the chalk is very hard water. I do not doubt that there are great inconveniences in hard water, but the hardness of water depends on the presence in solution of carbonic acid and carbonate of lime or chalk. Now, a very simple means has been adopted by Dr. Clark for the removal of that hardness. It consists simply in adding lime, by which the chalk is precipitated and removed from the water. I dare say it will be said that that is an expensive process. The fact is that it is already extensively applied in Canterbury, and I for one cannot see why the city of Canterbury should be supplied with this beautiful water while the inhabitants of London are supplied with the impure water from the Thames that I have described. Then if you apply this process of Dr. Clark for softening the water from the chalk, it must be remembered that the expense of filtering the water is saved, because the water has been so completely filtrated in its passage through the chalk that it does not need any further filtration. And now, having spoken thus in parenthesis of Dr. Clark's process, I may be permitted to quote from the report of the Chemical Commission of 1851. They say, at the conclusion of their report: "The inhabitants of London appear to have within their reach, in these chalk strata, a supply of water which is asserted on good authority to be inexhaustible, and which may be considered as everywhere of a uniform composition and quality. After having been softened it is an extremely pure water. The chalk water alone is uniform in its excellence at all times, the sources of it lying beyond the influence of weather or season. In the judgment of the commissioners, this splendid chalk water is entitled, from its chemical quality, to a preference over all others for the future supply of the metropolis. The water recommended appears to approach most closely to the standard of all that is excellent in the town supply, and is worthy of the greatest efforts and grandest works to procure and convey it; but the sources are near at hand, and the water is obtainable without difficulty or great expense. It is our deliberate opinion, which we would enforce in the strongest terms, that the much desired and most necessary improvement in the quality of the London water is associated with these sources of supply, and will depend upon their proper application to the uses of the public." But there is another advantage of this chalk water, and that is its temperature. The temperature of chalk water is uniform at 51° Fahr. in summer and winter, and therefore it is pleasantly cool in summer, and it does not freeze in winter. In summer it is 18° cooler, and in winter it is 18° warmer than river water, and it does not alter its temperature appreciably in passing through pipes and mains on the constant system, because it is calculated that it does not take more than 18 hours in its passage from the depths of the chalk basin to the mouth of the consumer. I now come to the estimate of the cost of the chalk supply to London. The present supply to London from chalk is about 20 million gallons a day to the Kent and New River Companies, and Mr. Homersham says the cost of wells, bore-holes, and works to procure a further supply of 100 million gallons a day would not exceed £200,000, and this may be considered an outside estimate; and he says he would guarantee to procure a supply of double that quantity—that is, of 200 million gallons a day—for £400,000, and that he also considers an outside estimate. And in support of this estimate of Mr. Homersham which may appear to us somewhat startling as to the cheapness of this source of supply, I may mention that the total cost of 600,000 gallons a day for Plumstead was only £2500, and that the total cost of procuring a supply of 1,200,000 gallons a day was only £700 or £800 more—namely, £3500—and that the cost of increasing the Brighton supply from 800,000 gallons to 2,500,000 gallons was about £3000. The water is so plentiful that by slightly increasing your bore-holes, and things of that kind, you can enormously increase your supply; and, therefore, I consider Mr. Homersham was justified in the evidence he gave to the Water Supply Commission of 1869, to the effect that the expense of getting this water from the chalk strata would be inconsiderately small. And now as to the cost of the softening process. This takes the place of the filtering process, and it must be remembered ought to be applied to our present Thames water, which is nearly as hard as the chalk water. Mr. Homersham's outside estimate of the cost of structural works for softening water in covered reservoirs is £6000 for one million gallons, and therefore, for 100 million gallons a day, our present supply, the cost of those structural works, the initial cost, would be £600,000, which I am advised by persons competent to form an opinion they consider is a very excessive estimate. Besides the expenses at starting for the softening of the chalk water, there would be the cost of time and labour. The expense of time would be about £1 per million gallons, and that of labour about 7s. per million gallons, making a total of £1 7s. Mr. Simpson stated that £1 per million gallons would be a nearer estimate, and Dr. Frankland went still lower, and stated the current expenses at 15s. per million gallons. But perhaps the best estimate was that of the Chemical Commission of 1851, who estimated that the additional cost for softening the water would not amount to more than 2 per cent. on the present price of water, and some return would be obtained from the lime used in the process, for Mr. Homersham estimated that the precipitated chalk would be sold at 15s. per ton. In any case, I think the expense of softening the water ought to be incurred even for our present Thames water, as by softening the water a vast outlay will be saved in the expenditure of soap. The saving of soap in Glasgow, after the introduction of Loch Katrine water, was fully one-half (according to Mr. Bateman). He says: "The manufacturers who used

large quantities of soap, and who knew what their consumption was, found that they did the same work better with three boxes of soap than they had done previously with eight, so that they saved five-eighths of the soap previously used." The question, as affecting laundries and the washing of linen, is also important. We spend a great deal more in the washing of our shirts than we do in the making of them; and where soft water is used in washing, half the soap, which is necessary where hard water is used, is sufficient. The total expenditure for soap in London is £1,000,000 a year, and according to Mr. Bateman's estimate £500,000 would be saved by the use of soft water. Even supposing that estimate to be exaggerated, some £100,000 or £200,000 might be saved, which would more than cover the cost of the softening process. There will also be a large saving in the wear and tear of clothes, especially in linen, for chemicals will not be used in washing, and the linen will be whiter. I now come to the second part of my motion, which deals with the way in which water is delivered. At present the water is supplied on the intermittent system, which stints the supply of one of the chief necessaries of life, and occasions great loss by preventing fires from being extinguished as easily as they could be under a system of constant supply. The constant supply system will save the expense of putting up cisterns in new houses, and lessen the liability of both pipes and cisterns getting frozen up in winter. But the great objection to the keeping of water in cisterns on the intermittent principle is its liability to contamination from soot, dust, filth from insects, vermin, sparrows, cats, and children; stench from adjoining cesspools, rain water washings, smells from waste-pipe, and dirty, mouldering, coverless butts. The evidence of Mr. Simon and of all the authorities before the Water Supply Commission, showed that an intermittent supply could not be defended, because, even if the cisterns were ever so clean, the long detention of the water in them made it very disagreeable to the taste. It was most undesirable that men should be forced to the gin-shop and the tap-room for want of pure and agreeable water. All the sanitary medical authorities, as well as the Chemical Commission of 1851, the inspectors of the General Board of Health, the commission on the river Lea, and the commission presided over by the First Commissioner of Works in 1867, reported in favour of a constant service; and the supply of water on that system has been successfully carried out in every large town of the United Kingdom. Indeed, it is quite exceptional to find a town with an intermittent supply, and London is, therefore, conspicuous both for its disadvantages in the quality of its water, and in the mode of its supply. Mr. Bateman has had experience in introducing a constant supply into 25 or 26 towns and cities. In one of these cities, Glasgow, great waste had undoubtedly been committed, but that was because the people thought the supply from Lock Katrine was practically inexhaustible, and it did not matter how much they used; and it was only natural, under such circumstances, that they should not stint themselves. In Chester a constant supply was introduced; but, in consequence of the waste which took place there, the inhabitants got faint-hearted and returned to the old bad way of the intermittent supply. In every other case, according to Mr. Bateman's experience, the introduction of the constant supply has been completely successful, and resulted not in a waste of water but in a considerable saving of water. In Cambridge and Newcastle great difficulties were at first experienced, but were overcome. In London the average consumption of water per head per day on the intermittent principle is 32 gallons. In Plymouth, Devonport, Shrewsbury, Oxford, and other places on the same principle, it is 30 gallons or more. But the average consumption in the large manufacturing towns of Lancashire and Yorkshire, including that for trade purposes, is only from 16 to 21 gallons on the constant system. In Manchester, the consumption for domestic purposes is only 14 gallons on the constant principle, which is about half of the consumption in London. In Mr. Bateman's opinion, the normal requirements of the inhabitants of the metropolis, even including the supply of public baths and wash-houses, which are great sources of waste, would be met by from 15 to 20 gallons per head per day. I may also refer to the testimony of Sir J. Heron, given on this point before the Water Supply and Rivers Pollution Commission. It is urged that the constant supply will be liable to great interruptions, as the pressure is so great on the pipes that they will burst; but I maintain there is greater pressure under the intermittent system, where the pipes are idle for the greater part of the day, and then are suddenly put to a great strain and pressure for a short time, having to force water to the tops of houses. Mr. Bateman says that, in his experience, he never knew pipes to burst in consequence of a constant supply. It is also objected that there will be interruption, as the water is shut off altogether when any repairs are going on. But the same objection applies to the intermittent system; and, with regard to interruptions to supply, Mr. Bateman says, "complaints of inconvenience arising from interruption are scarcely ever heard of in towns where the constant supply is at work." Mr. Bateman further says that the introduction of the constant supply into Manchester has reduced the amount of property destroyed by fire from 21 to 7 per cent., and increased the amount saved from 8·6 per cent. to 93·2 per cent.; and Captain Shaw, chief officer of the Metropolitan Fire Brigade, in his last report, in 1870, says: "The really important object is to obtain the water with quickness and certainty, which can be effected only by means of a constant high-pressure service. I presume that London will not submit much longer to the inconvenience and risks of intermittent water supply, and I confidently anticipate that when constant high-pressure services have been established all over the metropolis, the quantity of water used in extinguishing fires will be still further reduced; for it must be remembered that in many cases a single gallon at an early stage is more effective than a million gallons half an hour later." It may be urged against my proposal that it will create considerable alarm in consequence of the increase of rates which it will cause, but that objection is not difficult to meet, by the experience of other places. In Manchester the supply has cost £1,780,000, and in Glasgow £1,600,000, the result being that in Manchester the water-rate is a great deal less than formerly, whilst in Glasgow it is no greater. Mr. Bateman gave the Water Supply Commission the following estimate as to his own plan:—"The people of London could be supplied after the expenditure of nearly £8,000,000 with the softer water of Wales at a rate of 10½d. or 11d. in the pound on the rateable value. These rates are much lower than those charged for the supply of the hard water of the Thames." Mr. Bateman also gives a comparative statement of the outlay actually incurred in several large towns for improved supplies of water, including compensation to old companies—Glasgow, £1,600,000; Manchester, £1,780,000; Birkenhead, £320,000. The Water Supply Commissioners say that the proportionate outlay for London would be more than £25,000,000 on the basis of the assessable value of the dwelling-houses; but great as is that expenditure, I maintain that we should not shrink from it, if the result be that we obtain a pure water supply for the metropolis. But such an expenditure is not necessary, and the cost to be incurred would be much less. I am obliged to the House for having heard me so patiently, and now I shall conclude in the language of Mr. Simon, who says: "Cholera ravaging here at long intervals is not Nature's only retribution for our neglect in such matters as these in question. Typhoid fever and much endemic diarrhœa are, as I have often reported, incessant witnesses to the same deleterious influence—typhoid fever, which annually kills some 15,000 to 20,000 of our population, and diarrhœa, which kills many thousands besides. The mere quantity of this wasted life is something horrible to contemplate, and the mode in which the waste is caused is surely nothing less than shameful. It is to be hoped that, as the education of the country advances, this sort of thing will come to an end; that so much preventible death will not always be accepted as a fate; that for a population to be thus poisoned by its own excrement will some day be deemed ignominious and intolerable." The honourable gentleman concluded, amidst loud cheers, by moving—"That in the opinion of this House the water supply to householders in London should be derived from pure sources, and should be delivered on the constant system."

Dr. LYON PLAYFAIR said: I rise to second the motion, which has been brought before the House by my honourable friend in a speech which displayed so much knowledge and accuracy. On a recent occasion the Home Secretary invited the House to use this motion as a sort of conduit-pipe, through which their ideas might gush before the Metropolitan Water Bill occupied their attention. But, as the Speaker has ruled that we cannot discuss that bill in this debate, I will simply draw attention to the condition, on which any bill which offers to supply London with pure and wholesome water should be based. It is a great evil that the House can give only such a short time to the discussion of a question so important as that on which we are now engaged. To the Army Bill, involving the interests of a small class, largely represented in this House, and involving an expenditure of only £8,000,000, ample time can be given. But here is a bill in which the population of London is deeply concerned, and relating to an outlay of £15,000,000, in regard to which the Home Secretary says we must gallop through the discussion in a single night, and in a thinly attended House. The object of this bill is to supply London with pure and wholesome water, the present system being a gigantic monopoly, more complete than any I know. Gas is also a monopoly, but, if I am dissatisfied, I may cut it off; or I may have recourse to oil and candles. But I am bound hand and foot to the water companies. To go to the wells or water-pumps is out of the question, for they are little better than cesspools, or churchyard water. We are justified, therefore, in imposing new conditions on the water companies. It may be said that it is the interest of the companies to supply pure water. But their whole history is against relying on such reasoning. The House will probably remember a pamphlet, published in 1827 by a director of one of the water companies, in which the writer states that he could not die in peace without confessing to the 7000 families whom he had been poisoning for some time by the water with which they had been supplied. In a parliamentary paper presented to the House in 1856, the medical officers of the Privy Council said there is at least one company which supplies the filthiest stuff ever given to the community, contaminated with excrement of the metropolis, living molecules, and infusorial life. Since 1821 and 1828 this House has been trying to enforce conditions on the water companies, for the improvement of their supply. Various bills have been brought forward from time to time, and legislation has been attempted. But that which we have to consider to-night is to carry out the recommendations of the committee of 1867, and those of the Royal Commission of 1869. It is right to state that the water now supplied by the companies is not so bad as that with which Mr. Seymour made the world acquainted in 1856, because an Act was passed in 1852 enforcing the condition that all the water should be taken above the Teddington Lock. Beyond this, however, there was a vast watershed, throwing out the excrement of 860,000 people, together with the manure of 2,250,000 acres of land. London has spent £6,000,000 to get rid of her own filth, and it is not unreasonable to ask that something should be spent to get rid of that of her neighbours higher up the river. No bill can be satisfactory to the House that does not join the distribution of the water, with the conservancy of the two rivers—the Thames and the Lea—which supply seven of the eight water companies of the metropolis. The surface must be scavanged, and the drainage diverted. There is the most complete disorganization on the subject of the water supply of London. I do not believe that the Thames can ever give good water, still less can it do so if the conservancy is bad. If they do not remove the filth of 860,000 persons, the people must drink it. There are eight companies, and the difficulty in the way of proposing that the Board of Works should be the public authority to procure the supply of water is that the Conservancy of the river is a separate matter. Those interested in the water companies will say there is a self-purifying process going on in the river, and that all the filth is burnt out by the air—a statement which subsequent researches have proved to be unfounded. The mistake of the Metropolitan Commission which stated this opinion is a natural one. They found when the Kennet came charged with filth into the Thames, and failed to mix with it until after descending the stream as far as Sonning Bridge, that its water was less pure, and it is in evidence that not one of the germs which produce cholera or typhoid fever was destroyed in it passage downwards. And this is the opinion of a commission consisting of the most competent authorities respecting our water supply. Let us, then, not pass any bill without an arrangement for bringing together the subjects which ought to be brought together. There is complete disorganization and dissension in the water supply just now. You have a bill for regulating the supply, but you cannot carry it out, because the conservancy of the Thames and numerous interests are hostile. I now come to the principal subject of my honourable friend's speech—viz., the second part of his resolution, which has reference to a constant supply of water to the metropolis. Upon this, however, I need say but little, as it is a matter upon the immense importance of which we are, I think, all agreed. There is scarcely a town in the country which is supplied in any other way than by a constant service of water except London. If you offer me a bill which will give a continued supply of water, I will accept it as a fragmentary measure of reform, and I will accept it also with the greatest thankfulness and sincerity, as the benefits arising from the constant system are so great. Until we can obtain for London a good and proper local government, I will be content if we can obtain a constant supply of water. The quality of the water is immensely deteriorated by an intermittent supply, even in large houses where there is abundance of cistern room; but in the houses of the poor, where the receptacles for water are of the most wretched description, the water is deteriorated to an alarming extent. This, in fact, is not a rich, but a poor man's question. In the rich man's case the water, perhaps, would not be possibly much deteriorated, but still it gets deteriorated there also. Some short time ago I bought a house in London, and the first thing I found was that the waste-pipe was in constant communication with the sewer, and consequently I was drinking nothing but a solution of sewage gas. I found that three of my neighbours were in the same predicament, and that their families had suffered from typhoid fever in consequence. If this takes place in a rich man's house, do you believe the poor can escape such consequences, when it is known that their water receptacles are almost always contiguous to cesspools and other places of pollution. This is the cause in a great many instances of the fearful epidemics with which they are visited, and which is the cause of such great mortality. Many years ago I was a member of the Health of Towns Commission, and I was exceedingly surprised at the time to find that the poor could give no evidence of the quality of the water in their neighbourhood. They could, however, give abundant information respecting the beer; but I was not surprised afterwards at their ignorance, when I came to taste the warm vapid water which they could not have been expected to drink. I hold, therefore, that the constant supply would be a great benefit to the poor. At present there is no supply from Saturday to Monday, leaving them 48 hours without a fresh supply, and that during the two days in which they most require it. Let us give them water unpolluted with sewer gas, although they may have to drink sewage from other sources. I am supposing that a constant supply should be given abundantly to the poor. I read with great indignation, in the report of the Water Commission, that there would be no difficulty about a constant water supply if means were taken to prevent waste. If such dodges, as I may call them, are to be practised by the water companies to restrict the supply of water to the poor, I think the sooner that the duty of supplying the poor is taken out of their hands, and handed over to a public trust the better. The greatest of sanitary laws is contained in the four words "wash and be clean," and anything to oppose that law is injurious to a great community. My honourable friend alluded to the great advantage of a constant supply in case of fire. I can only say that when I was on the Health of

Towns Commission I made many experiments, and gave false alarms of fire to houses, some with a constant, and some with an intermittent supply of water, and the difference of time in which the hose was got to work in the two cases was extraordinary. My honourable friend has told you of the great saving which occurred in the case of Manchester, and that saving has been progressively increasing ever since the return was published. Under the constant service system the saving in the matter of fire has risen from 60 to 90 per cent., and therefore the economy is extraordinarily great. If, therefore, any measure should be proposed by the Government for giving a constant supply, I will accept it with gratitude, but I will not accept such a measure as that of 1852. In the Act of that year, large powers were given to the Board of Trade. Clause 4 gave that board power to have the water filtered, but it was perfectly useless, and to this day the water is imperfectly filtered. Dr. Frankland reports that in many cases he found it quite unfit for domestic purposes. If in 1852 a Government department having large powers could not carry out so simple an operation, is it likely that another board could carry out a constant supply of pure wholesome water unless we secure its comparative efficiency? There is an enormous *vis inertiæ* in the water companies. There will be a great expenditure in exchanging the intermittent for the constant supply, and for this reason: so long as the intermittent system lasted the question of fittings was one more for the consideration of the consumers than the companies, and they have allowed the most miserable and wretched fittings to be used. There will, therefore, be a considerable expenditure until these fittings have been made better; but a public trust would make the fittings good, even although they should thereby increase the rates. I am not allowed to allude to the bill of the Government, but I may allude to a paper which has been placed in my hands by the water companies in relation to the motion of my hononourable friend the member for Hastings. In that paper it is said the Government is to ask the House not to pass the compulsory powers of purchase. If that is the case, I have little hope from the bill, as it would be directly contrary to the report of every committee and commission, except that of 1857. In the great report of the Health of Towns Commission it was expressly stated that there would be no hope of reform unless the water companies were converted into public trusts. In 1859 the report said that no good supply could be hoped for so long as the water supply was allowed to remain in the hands of the companies, to whom it would be impossible to give the powers they asked for. I have as little hope of the bill of 1871 as I had of the bill of 1852; and, besides, it is only postponing the evil day. The expediency of purchasing up the companies was before the House in 1851, and it could have been done then for £4,000,000 less than it would cost now. The companies attempt to frighten us by saying it would cost £1,500,000 to give a constant supply; but an able engineer states that if you have a proper consolidation of those companies through compulsory purchase, and thus put the second necessary of life into the hands of a public trust, you may save an enormous sum by that consolidation. In the year 1851 a statement was made which is worthy of examination. It was stated that a consolidation could be effected for the sum of £90,000 a year, and that that sum, if capitalized, would be ample to effect every necessary change. I admit that the difficulties of the Government are very great. We have no proper local government in the metropolis. There are persons who do not wish to give the Board of Works large powers. I do not know whether any one here has read a document called the Shoreditch Improvements Bill, but there they will find that the officers of health state that it is impossible to consider the claims of London to sanitary improvements as a whole, in consequence of the contradictory demands of the various vestries. The West-end vestries have petitioned against a constant supply of water; but, in fact, this is not a West-end question, but an East-end question. It is not a rich, but a poor man's question, and the poor man has little hope with regard to this question from the Board of Works; therefore, sympathizing as I do with the Government in this difficulty, I will cordially accept a constant water supply, first, because London should not be the only town left on the intermittent system; and, secondly, because the supply of one of the first necessaries of life should not be a subject of commercial venture, but one of a public trust. I therefore beg to cordially second the resolution of my honourable friend.

Mr. CLAY: My honourable friend, the member for Hastings, has made a very interesting speech, and has not addressed the House without showing that he has a due sense of the best mode of getting up a case. With the last thing he has said I entirely agree; but he invites the House to affirm two propositions. The first is that the water supply of London should be taken from pure sources. It would be difficult to get a more simple proposal, or one that the House would be more inclined to regard with favour. But it is asserted that the quality of the present supply of water to the metropolis is prejudicial to health, and if there were any doubt on that subject, the speech of the honourable member for Edinburgh would have removed it. We must remember, however, that in 1867 and 1869 there were two exceedingly painstaking and accurate inquiries, in which all men of science were invited to assist, in order to come to a decision on this subject. How was it that these inquiries were decided? I am not about to say that the inquirers decided rightly, but I think I have a right to say that such facts as were elicited by the committee presided over by the Chief Commissioner of Works, and by the Duke of Richmond's commission, ought not to be altogether ignored. First, with regard to the report of Mr. Ayrton's committee. It is said there that the quality of the Thames water might compare advantageously with the water of any other town; and in the report of the Royal Commission there is no evidence to lead us to believe that the water supplied by the companies is not generally good and wholesome. These statements were the result of the most careful investigations, and the highest science that could be obtained; and it does appear to me that, if my honourable friend wishes to upset the reports of the committee and the commission, his proper plan would be to ask for another committee or commission, by which he could prove that every statement he has made to-night rested on the highest authority. At present his statements must be accepted with less deference than the reports of the committee and the commission. My honourable friend has alluded to the Rivers Pollution Commission. I am not sorry I have not had the same advantage he has had in reading that report, as it has not yet been placed in the hands of members of this House. However, if it were so, I should say that the evidence of Mr. Ayrton's committee and the Duke of Richmond's commission was so strong that it could not be upset, except by a similar authority. My honourable friend has spoken, in terms that may well frighten all honourable members, of the things which we are obliged to drink, but I may assure honourable gentlemen that they need not be so easily frightened by scientific terms. We are told that we are drinking living organisms, and I was once very much frightened myself to think that I had been drinking them all my life; but my fears were allayed when I was told by a man of science that we are continually inhaling living organisms with every breath. I trust that this announcement may relieve the nerves of honourable gentlemen. My honourable friend has proposed a substitute for the Thames water, but his idea is not new, and, if it be adopted, it should be only adopted upon high authority. I am unwilling to trouble the House at this time of the night with quotations, but the Royal Commission, amongst other things, reported with regard to the supply from the chalk districts. It did not agree with those who contend that an unlimited supply could be obtained by simply tapping the chalk; and it goes on to say that, if a supply could be obtained, it could only be done by subtracting from the supply of it to the rivers. Now, would it be a considerable benefit if, by supplying London from such a source, you were to dry up the rivers? However, let my honourable friend prove his case. Let us have a commission, and then we shall see whether, if he gets his supply, he does not dry up all the neighbouring small streams. He would not, I believe, wish to dry up the Thames, because that is not potable water. But suppose him to get water from the chalk strata, he confesses himself that it would be too hard for drinking.

Mr. KAY-SHUTTLEWORTH: I did not say so.

Mr. CLAY: Well, you said it would be better if it were softened. A great deal of evidence on that point was taken by the Royal Commission, as to the difference between chalk water and Thames water for drinking and other purposes, and many of the most scientific men in this town were examined, and the majority gave their opinion that one water was just as good as the other as to softness, some going so far as to say that the Thames water was decidedly the softer. These were Dr. Letheby, Mr. Simon, Dr. L. Playfair, Dr. Odling, and Sir B. Brodie. The opinion generally expressed by them was that the water drawn from the chalk was not so good for drinking purposes, with regard to that special condition of softness, as the Thames water. We are therefore going to express our approbation of the system of drawing water from chalk in direct opposition to those scientific men, and, when we do get it, we must expose it to Dr. Clark's softening process. Now, supposing that 100 million gallons is the daily consumption of London—which, I believe, is the amount stated by Dr. Frankland—I ask what would be the expense of softening such a vast amount of water as that. Dr. Frankland fixes it at 15s. a million gallons, but I fancy I have seen an estimate for 14s. 7d. Mr. Homersham has, however, calculated the cost at 21s. a million gallons. I have myself consulted an engineer, who thinks it would not be less than 27s. I will, however, split the difference, and take 20s.; and, putting the expense of erecting the reservoirs for softening at £600,000, that sum, at 5 per cent., would give £30,000. We are asked to give an increased supply from this new and doubtful source, and to do it at a cost of £66,500 a year. Well, I do not say that the proposal is absurd, but I assert that the honourable gentleman is bound to establish his facts, and not to ask the House, in this casual way, to affirm his resolution. There is another proposal, which has been gone into at great length by the honourable member for Edinburgh, and which contains the principle of constant supply. That principle has been more than once alluded to. But I would rather prefer saying what I have to say respecting it when the bill comes before the House. I will only say, at the present moment, that I am sorry that my honourable friend the member for Edinburgh University has gone back to the almost forgotten time of the Health of Towns Commission, in 1821. I was sorry he went back to the time when the supply was not taken from the source at which it is now obtained. In 1852 the water companies were obliged—and to my mind very properly obliged; I make no complaint whatever about that—but they were obliged to go up the river, and take their supply from where they take it now—namely, at Hampton. That necessitated a very great expense. But the companies fulfilled the commands of Parliament, as they have always done, within the time, with the utmost accuracy and without any complaint whatever being made against them. I was sorry, therefore, to hear complaints made by the honourable member that such was the *vis inertiæ* of the water companies that they never would do anything. All I can say is, that I challenge the House to point out anything which Parliament has desired the companies to do that they have not done with the greatest accuracy. With regard to the question of a constant supply, I should prefer to make the observations I may think necessary when the bill now before the House comes on for discussion. I would only say that, if I speak against the constant supply, I do not do so in any way as the representative of one or more water companies, but as a householder, and I should ask Parliament not to enforce it upon me.

Mr. G. HARDY: In saying the few words I have to say on this subject, I will not lead the House to suppose that I am not a party, to a certain extent, interested in this question. I am the inheritor of certain shares in the New River Company, which has not been attacked to-night, and, therefore, I am not going to address myself to any point connected with that company. But in consequence of that connexion I have certainly taken great interest in the question of water supply, and I believe that I have, as far as possible, made myself acquainted with the whole of the evidence that has been given on the subject with reference to London. I could not help thinking to-night, as my honourable friend, the member for Hastings, was speaking, how easy it is for a counsel to bring forward a very satisfactory case. We know that if in a committee the opening speech of counsel was taken in the place of evidence, the decision of the committee would be very simple and very easy. But when my honourable friend proceeded with his case, and, quoting from Mr. Bateman and the other great authorities who have been examined before these different commissions and committees, said he was not going to bring forward their scheme, but was about to back up a scheme of his own, as it were—that of getting water from the chalk formation—then I could not help thinking how very improper a tribunal he was addressing with a view to inviting them to come to a decision upon such a question. The House of Commons is called upon to overthrow, at the bidding of a single member, backed though he be by the honourable and learned member for the University of Edinburgh, conclusions arrived at by commission after commission and committee after committee; and they are asked to do this at once, and come to a conclusion upon the statement of one honourable member in the House, without any reference whatever to any evidence that has been adduced upon this subject, as though none of the matters referred to had never been inquired into at all. It would be very improper for me, on a night of this kind, when the House has been sitting so long, to detain it by quoting evidence; but I will venture to say that if the House will take the trouble to look at the extracts from the chemical evidence which are in the report of the Royal Commission on Water Supply, they will see that chemists, like doctors, differ materially. They will see a great deal more than that. They will see that chemists of the greatest eminence are content to place their conclusions before the commission by guess-work, and not from actual experiment. I venture to say that there is not in that chemical evidence which has been pressed upon the attention of the House to-night one single instance of chemical analysis upon which they rely for the conclusions to which they have come. As to Mr. Simon, for whom I have the greatest respect, and who, I believe, has done an immense deal for health and for sanitary improvement in this country, I should like just to call the attention of the House to what he says. He is asked about the flow of the water through the soil, and whether he had formed any opinion as to whether the water taken from above Teddington Lock, and running 15 or 20 miles, would be safe water, and his reply is: "I should think it quite as safe water as regards the danger we are speaking of." Then he goes on to say that "a speculative answer is not enough on this subject, and I can only give a speculative answer at present. I think the water would be harmless, but possibly the result might show that the water could not be deemed quite safe." That is the nature of the evidence of every one of the chemists. Dr. Frankland even can detect nothing by analysis, but he assumes from certain conditions detected in the population that the water does the mischief. I am not at all wishing to dispute the necessity for the fullest investigation into the subject; I think it most desirable and beneficial to the country that the inquiry should be conclusive; but with the greatest respect for the ability with which my honourable friend, the member for Hastings, has discussed this question, I must decline to take him as the only witness against all the witnesses who have been examined on the other side. This is a very important question, because the chemists have not yet arrived at a definite conclusion. I will presently tell you how they do arrive at conclusions in other matters. The medical officer for the City of London says it is quite a mistake to suppose that these chemists have arrived at a proper conclusion. I take up the death-rate of different towns, and what do I find? That in the towns supplied with that beautiful soft water which the honourable member for the University of Edinburgh alluded to, the deaths are 28 in 1000

while in the towns where the people are supplied with hard water the deaths are only 22 in 1000. I do not come to the conclusion that the water is the cause of death in each instance, but surely in cases where the chemists cannot detect what exists in the water it is just as unreasonable that they should come to the conclusion that the water was the cause of the exceptional death-rate in other parts of the country. But here you find a conclusion drawn by one medical man quite contrary to that drawn by another. When my honourable friend told us that his wish was to disgust the House with the water drunk in London, I confess I felt a little uncomfortable; for, when in London, a glass of water the first thing every morning and the last thing every night is what I have taken for many years past, and I have never experienced any of those dreadful and poisonous effects from it. There is a disposition, however, to attribute every evil under the sun to whatever beverage a man drinks. If a man is pleased to drink beer, it is supposed to be adulterated; and if I were to be ill, my honourable friend, the member for Hastings, would probably attribute my illness to the Grand Junction Water, for I have the misfortune to drink Thames water, and have drunk it for many years past. With respect to the cholera outbreak in 1849 and 1854, I would ask, was it owing to the water supply here. I do not say it was not. I have no means of knowing it. All I wish to point out is, that the greatest possible difference exists amongst the doctors themselves on the subject; and I know that the conclusion arrived at by the committee over which my right honourable friend, the member for the Tower Hamlets, presided, and which was selected with great care, was, that the water was not the cause; at all events, that there was no proof that it was the cause. They went further, for, having investigated the supply of water in London, they came to the conclusion that it was impossible to say that the Thames water was not a safe supply. I will read one passage on this subject which my honourable friend, the member for Hastings, did not read to the House. In 1867 the committee reported that they were satisfied that both the quantity and the quality of the water supplied from the Thames was so far satisfactory, and that there was no ground for disturbing the arrangement made in the Act of 1852. I do not desire to say anything of the sort; but what I want is to prevent the House from coming at once, upon the mere statement of the honourable member, to the conclusion that you are to go to new sources, and act upon a different system. That is what I want. I do not want this House to come to that conclusion, because I do not think it would be a reasonable or a fair thing, nor do I think that the House is in such a position as to enable it to deal with this question satisfactorily. My honourable friend said he threw over Dr. Letheby. Well, it is true that Dr. Letheby and others take different views from those of Dr. Frankland, and adopt different modes of dealing with the water. What conclusion do I come to upon that subject? Not the same as my honourable friend, who throws over all those who do not agree with his own conclusions. I say that the chemists have not arrived at a definite solution of a great question, and that we ought to wait. I am quite content that these matters should be referred to a committee, and to wait the result of further investigation. The water companies of London are to go before the committee on the bill now pending, and as to the proposed compulsory sale, what I think all those interested have a right to say is this: "If we are to sell our property—to which I personally have no objection—let us have somebody with whom to deal who is to act in a different way from what is proposed under the bill." I am now arguing on the assumption that the bill is in its original state. Then the proposition was that the companies should do all the work, and when we had done all the work should sell ourselves to anybody who would employ us, having first incurred great expense. Of course, we objected to such a proposal; but, with respect to the question of compulsory sale, I have not a word to say against it. If you can find a public body who will buy us whom Parliament can thoroughly trust to deal with this great question, and if you think the thing can be done better by a public body than by commercial bodies, I personally have no objection to substitute such a body for the water companies. But with respect to commercial speculation, let me remind the House that without that commercial speculation, beginning with the honest Dutchman who preceded Sir Hugh Myddelton, you would never have had anything like a water supply. Much also was due to James I., who did a successful thing in promoting the New River scheme, and in committing the whole management of it to the adventurers who took half the shares, so that to this day, though the Crown is no longer interested in them, the King's shares have no part in the management. A friend of mine (Sir Joseph Heron) has been referred to with respect to Manchester. At one time I heard a good deal on the part of honourable members of this House on that subject, and I found that, so far from the water of Manchester paying its way, I do not believe that it pays its way at this moment. I believe they take £12,000 a year from the profits on gas, which is also in the hands of the corporation of the city of Manchester, to pay the expense of the water, and I have always thought it a most unjust thing that the supply of light should be taxed for the purpose of supplying other people with water. I do not think it a fair thing at all. I believe that goes on at the present moment. I have never heard that it had ceased, and certainly in former times that was the case. When, therefore, my honourable friend tells us that we are to make a great profit from this water, let him remember that the city of Manchester, in order to pay its way, is borrowing out of the profits on gas. My honourable friend talks of £25,000,000 for the metropolis as if it were a mere fleabite. But what is the most remarkable thing in this whole transaction is, that instead of the metropolitan members coming forward to tax themselves for the benefit of their constituents, and with a view of affording a supply of water to the metropolis, my honourable friend complains that they cry out against the proposal. Somebody has sent me a small pamphlet, which states what took place in Marylebone on the subject. I find a gentleman, who is moving the report, says: "It is my opinion, and I believe it is also the opinion of the committee and all here, that water is the cheapest article we obtain in the metropolis." And the committee says: "Your committee, having considered the existing system of supply, are of opinion that no sufficient case has been made out for effecting a change, or putting householders to the expense of altering their fittings to meet the requirements of constant supply." I have no objection to any amount of inquiry on the subject, but I think it a little extraordinary that the messenger of peace should come from Hastings, and not from the Tower Hamlets, or Marylebone, or any other part of the metropolis. Well, now, with respect to this chalk formation, I ought to speak favourably of it, for the company with which I have the good fortune to be connected by inheritance, gets its main supply from the chalk, and very excellent water it is, no doubt. I noticed that my honourable friend laughed when an allusion was made to the effect which might be produced from pumping too much from the chalk. One of the greatest geologists in this country is a reverend gentleman whom I have had the honour of meeting on several occasions, and I know he is consulted on these subjects continually. What does he say on this subject? He disapproves of obtaining water from the chalk. He says: "You would obtain a certain quantity, but it would be at the expense of the rivers. The rivers would cease to flow. When my advice has been asked, I have invariably said, 'Take the water which flows down above ground, and do not tamper with it below.' That is what I have invariably said, and I believe it is sound advice." The commission embody what he says in their own words. They say: "By taking the water as it flows down the river, on separation, there might be an immense storeage obtained in the upper districts." Well, it has been said you can use the softening process with great facility. Many years ago an engineer named Napier proposed to supply London with water from the Surrey sands. I do not know whether the honourable member recollects him, or knows these sands, but they are small streams running over sandy beds, and anything more dry or insufficient can hardly be imagined. Mr. Napier was a gentleman of great imagination and ability, and he said he would draw these little streams together, and thus produce an abundant supply of water. The scheme, however, completely exploded. Many experiments were made as to softening the water, and it was found there were two kinds of softness, or rather hardness, one of which was permanent, and it was ascertained that when you took the whole of this water from the Surrey sands you got water of 6° of hardness. I believe that the water with which London is supplied is of 14° of hardness, but when it is boiled it is reduced to 6°—the same as the water from the Surrey sands. Therefore, when my honourable friend puts forward the advantage of soft water, I do not think he can remember the report on Mr. Napier's scheme. In that report he will find that the process of boiling water makes the greatest difference possible. Thus we come to the necessity of using Clark's process, which I admit to be one of the most beautiful known in science. But there is one great objection to it, independent of the expense. The process, to be effectual, must last 24 hours, and you could not supply London with water after such a delay. It may be easily done in such a place as Canterbury, but just think of the enormous reservoirs that would be required for London. In fact, the delay, combined with the expense, would render it totally impossible. Besides, with reference to this question of boiling, I must say that I do not think there is anything prejudicial to health in drinking hard water. I know that certain kinds of soft water are very disagreeable, and that water from the red sandstone and chalk is more agreeable drinking than soft water sometimes. I merely state facts; I do not come to any conclusions. Well, now, with respect to the points which have been put forward by the honourable member for Edinburgh, who says you have a right to impose conditions on a monopoly, I agree with him there, and I think that the great water monopolies should be subject to conditions the same as railways or other similar large undertakings. I do not object to this on the part of the water companies. I think it a fair subject for inquiry; but it must be remembered that the Act of 1852 was supposed to establish State control. Now let me say a word with regard to constant supply. In the Act of 1852 it was provided that if four-fifths of the inhabitants of a district asked for a constant supply they should have it, and it has never been applied for up to the present day. With respect to the poor, I know that several of the companies have made great efforts to supply them, but a great difficulty arose in the shape of the owners of houses. Many propositions have been made. It was proposed, for example, to have a stand-pipe in every court. But then it would disappear the first night if there were any metal about it that could be sold. If we establish such a supply we must also establish some means of protecting it. All these things must be considered. My honourable friend may make his speech and propose his abstract resolution, but after all the question is one of evidence, and must be carefully considered and inquired into. I am not connected with the management of the New River Company, but I am authorized to say in its behalf that the managers are, and have been, most anxious to supply the poor districts abundantly. They have supplied from 50,000 to 60,000 people on the constant principle, and are anxious to make it general, and they have in many instances supplied their poor customers on Sundays. With respect to the rich, I know that they cry out against the constant supply, and would prefer to be left with the large cisterns. I am sorry that the honourable member for Bath is not here, but he told me that his house, being full of costly books and pictures, he dreaded the results of a constant supply, in case of any extraordinary pressure being put on the pipes, and causing them to burst. In such a case, he told me, an amount of damage would be done that nothing could repair. The companies are perfectly ready to have the question inquired into, and have no doubt but that it would be justly decided on by this House. I think I have now mentioned pretty nearly all the points which were touched upon by the members for Hastings and Edinburgh, and I ask the House to look upon the question not only with reference to the speeches they have heard, but with regard to documents and evidence which will be placed before it. It is all very well to throw over the committee of the member for the Tower Hamlets, but the committee sat only three years since, and the report of the Water Supply Commission is also thrown over by my honourable friend. That commission consisted of persons of whom it would be impossible to speak too highly. The Duke of Richmond went into it with an earnest intention to come to a right conclusion. He did come to a conclusion, in one sense adverse to the water companies—that is to say, he recommended that they should be handed over to some public body. There was also on that commission Sir John Thwaites, Colonel Harness, Sir B. Phillips, and other gentlemen of the greatest intelligence and highest scientific attainments; amongst others, Mr. Thomas Harrison, whose skill as an engineer must satisfy every one who hears me that the report of that commission is entitled to the respect of this House. But the honourable member for Hastings throws them all over, and takes his own scheme of chalk water. I do not throw that over. I know that it is very good, and that a great deal of it comes into the Thames, but he proposes to give it to us in its purity and its perfection. I say that his scheme will never work. You cannot carry out your own Acts of Parliament already passed. The towns up the river which pollute the Thames with their sewage are prohibited from doing so by Act of Parliament, but they continue to do so nevertheless. When I was in office I appointed Colonel Ewart to see that the Acts were carried out, and he, after a careful investigation, came to the conclusion that the towns on the river had done nothing in the way of interception. Do not let me be supposed as advocating a case. I am quite indifferent as to whether the water supply be managed by companies or by the public, and I know from experience that whatever may be decided on, these people who are subjected to compulsion will get compensation. I object, however, not only as regards the water supply, but generally to these abstract resolutions that pledge us for ever after. Let this be not an abstract but a concrete proceeding. It is a serious question that of how we shall obtain the best water for the supply of such a vast population as London. Do not let us be led away by specious arguments, but let the question be tested by the body of evidence in your possession. Let the subject be inquired into by the public, and then come to the conclusion as to whether the metropolis should be supplied by private companies or public bodies, and whether the water is to be drawn from the Thames or from any other source. Do not, I repeat, come to any rash conclusion.

Mr. Bruce: Those who were present at the commencement of the debate must have been much pleased with the ability with which the subject has been treated both by the mover and the seconder of the resolution. The resolution itself consists of words to which no Government could possibly take objection. It says "that the householders of the metropolis should be supplied with water from pure sources." Surely no one can take any objection to such a formula. It also asks that the water should be delivered by the constant system of supply, and that is already secured by the proposition of the Government. With much of the speech of my honourable friend, the member for Hastings, I cordially concur, but there is this one observation I would make. The honourable gentleman quoted most correctly a great number of authorities, eminent chemists and others, as to the polluted quality of a great deal of the water supplied to the inhabitants of London, and as to the pollution of the sources of supply; and I think my honourable friend was also careful to read the dates of his quotations, but the effect on the House would have been very different if we had recollected that many of the charges contained in those quotations were applicable to a state of things which has long since passed away, and are by no means applicable to the London of the present day. I know myself that much of what my honourable friend has said is not applicable to the present state of things.

For example, nothing can be more explicit than the quotations from Dr. Simon, nothing more emphatic than that gentleman's condemnation of Thames water; and yet I know, as a matter of fact, that, provided Dr. Simon is satisfied that proper care is taken to prevent pollution, he would be perfectly satisfied to retain the Thames as a source of supply. The statements of my honourable friend are, in fact, not new to the House. Over and over again it has been asserted that the Thames was not a safe source of supply. Alarms have been raised, and inquiries instituted, but always with the same result. In 1849 it was asserted that the Thames water ought not to be used for potable purposes. A commission was appointed, and that commission included some of our most eminent chemists. Their reports have been quoted by my honourable friend as strongly condemnatory of the Thames as a source of water supply. But what was the ultimate finding of the commission? The finding of the Royal Commission, which included the names of Dr. Miller and Dr. Hofmann, who is now, unfortunately for us, in Berlin, was that the Thames water was perfectly wholesome, palatable, agreeable in flavour, and uniform in temperature. The commission, however, recommended that means should be taken to prevent contact with the sewage, and that the water should be drawn from sources above the tidal range. They reported unfavourably on some of the schemes submitted, but drew attention to the chalk basin at Watford, supposing that its water could be made soft. In consequence of that report the Act of 1852 was passed—an Act which, however, fell far short of the expectations of those who framed it, The opposition of the companies foiled much that was intended by the Act, especially the idea of uniting all the companies under one organization. Supposing that scheme to have been carried out, a great economy would have resulted, but that idea was ultimately abandoned. The Act also provided for a constant supply for the metropolis, provided that it was demanded by four-fifths of the inhabitants of a district. My right honourable friend (Mr. Hardy) asks how it has come to pass that the constant supply has never been asked for. I should like to know for what purpose four-fifths of the inhabitants of a district have ever been able to come to a common agreement. The system consisted mainly of this, that all water taken from the Thames should be drawn from a point above the tidal range, and it was also insisted that all water stored within five miles of the metropolis should be covered over. My honourable friend, the member for the University of Edinburgh, has drawn a frightful picture of the immense amount of contamination suffered by the water of the Thames. He says that, in round numbers, some million of people live in the basin of the Thames, and that the whole of the sewage of that population passes into its waters. But that statement is in direct contradiction to the finding of the commission.

Dr. L. Playfair: I said 860,000.

Mr. Bruce: Then it was the mover of the resolution who gave the figures without any deduction, whereas the commissioners make very large deductions, and state that, in their opinion, only a very small part of the pollution that might be anticipated from that large population really does pass into the Thames. But the answer to the supposed charge was that natural causes—in the flow of water and the various chemical processes going on in the flow—had the effect of purifying the waters in their passage down to the various sources of supply. My honourable friend who introduced the subject founded his statement very much upon the evidence of Dr. Frankland, but omitted to quote one remarkable statement of that gentleman, to the effect that the result of his examination was that the purest water found anywhere was found at Hampton. Dr. Frankland and another eminent chemist carefully examined the water of the Thames, and, instead of finding the lowest point of the river, as might have been expected, the most polluted, they found it, in fact, from the causes I have just mentioned, of all others the freest from pollution. Well then we have the report of the commission of 1851, consisting of scientific men, that the water of the Thames was pure and wholesome; we have the inquiry of 1867, conducted by a select committee of this House, presided over by my right honourable friend the Chief Commissioner of Works, coming to the same conclusion. After hearing the fullest evidence from gentlemen perfectly competent to give an opinion on the subject, the latest finding we have is that there is no evidence to lead us to believe that the water now supplied to the metropolis is not generally good and wholesome. The right honourable gentleman the member for the University of Oxford was quite justified in saying that the House, and I may add the Government, must rely in these matters on the finding of authorized commissions and committees, and not upon the opinions of honourable gentlemen, supported by individual cases. I have no doubt the water of the Thames is capable of considerable improvement, but I have also no doubt that it is in course of receiving that improvement at the present time. Though the city of Oxford has not yet taken the measures that might be taken for the purification of the Thames in its neighbourhood, the operation of the law will no doubt soon compel the authorities to abstain from polluting the river with sewage; and at this moment, as I am told, Reading, which was one of the two great offenders, is spending a sum of £25,000 to get rid of its sewage without injury to the river. The Thames Conservancy Act is in operation, and every day sees something done, under its provisions, for the purification of the water. A good deal of the speeches we have heard and the evidence adduced was derived from the report of an inquiry into the state of the East London Water-Works, and no doubt very hard and true things were said of that company at the time; but it has since exerted itself to improve its supply and delivery, and it now stands at the head of all the companies in the pains it takes to give the poorest classes in London a constant supply. I have here an abstract of the metropolitan water companies returns, and I find that, whilst there are in all London only 35,188 houses that receive water on constant service, the East London Company supply 32,723. Out of 96,000 houses in their district they have succeeded already in giving a constant supply to 32,000. I was surprised to hear the right honourable gentleman state that the company with which he is connected supplied 60,000 houses with a constant service.

Mr. G. Hardy: I said a Sunday supply.

Mr. Bruce: I misunderstood the right honourable gentleman, and I quite admit that, as a rule, for the better class of houses an intermittent supply is quite sufficient for all the ordinary purposes of health and cleanliness. For the reasons I have stated I cannot accept the resolution in the sense that it is condemnatory of Thames water, but as a general statement I have no objection to it at all. In the face of all this evidence, depending upon different inquiries by different minds, the most scientific as well as the most practical, it is impossible to accept the conclusion that the Thames is not a proper source of water supply for this metropolis. When I come to the second part of the resolution I confess I should be glad to see it adopted by the House. At the same time I must admit that there is great force in what was stated by the honourable member for Hull, and also by the right honourable gentleman the member for the University of Oxford, as to the difficulty of providing a constant supply so long as the supply is in the hands of various companies, each of which it would be necessary to arm with very large powers for the protection of their property if they were called upon to give effect to the constant system. The subject has been carefully considered by the Government. I was asked last session, I think, and the session before, whether the Government intended to give effect to the report of the commissioners of 1868. My answer then was that I thought full effect, until the question of providing an efficient local government for the whole of the metropolis had been decided, could not be given, because no doubt to give proper effect in the most satisfactory manner to the constant system there would be a great advantage were all these companies united into one, and managed by a body having the complete confidence of the whole population of London. But the success of any measure dealing with so large a subject, if not remote, at any rate was not very near, and the Government had to consider whether they were justified in the meantime in depriving the poor people of the great advantage of a constant supply, and it was with that object that we introduced a bill, which I should be glad to see read a second time, and referred to a select committee. I will not anticipate the discussion that may take place on that measure, but will only say in regard to it that I think the Government has been met by the water companies in a very fair and liberal spirit. I do not, therefore, anticipate from them any serious objections to the propositions made on the part of the Government. I am fully of opinion that it would not do in London, the circumstances of which are in many respects so peculiar, to apply immediately and uniformly the constant service system. It should be done gradually, and in carefully selected districts, and the bill was framed to give effect to that principle. I have no doubt that the effect of a constant water supply on the health and happiness of the people would be great indeed. My honourable friends have quoted evidence to show the evil results of the present intermittent supply. They have shown from the evidence of persons authorized to speak on the matter the foulness of the water drunk by a large portion of the poor people of London. They have shown that it is collected in receptacles which are receptacles of a great deal besides water, and that of a filthy description, and in all our great towns the constant supply system is found not only conducive to health, but, properly managed, to economy also. The Government, therefore, felt it better to introduce a measure which they admit to be imperfect, but which is capable of conferring great advantages, than to wait till they could consolidate the various companies into one, and hand the management over to such a system of government as the Corporations of Manchester and Liverpool. One course of action was within reach, the other a great deal beyond, and we thought it better to give a little less than to wait in the hope of giving more at a more remote period. I did not gather from the member for the University of Edinburgh, who pointed out the great advantages of uniting the companies, that he objected to the action of the Government, and I think, on the whole, he was of opinion that the course they were taking was, under the circumstances, the best. There is no advantage in dwelling further upon the matters which have been gone into so very fully already, and, I must say, with great fairness, by the members who have addressed the House on this occasion. I am glad this discussion has preceded the discussion on the bill which the Government are anxious to pass, because I think that whatever may be the opinion of members as to the details of that measure, no one who has heard this discussion will venture to assert that the measure was not called for by the exigencies of the metropolis. To the resolution as it stands I, on the part of the Government, can offer no opposition, although I cannot accede to the interpretation which my honourable friends have put upon a certain portion of it. The resolution itself is perfectly harmless. It is an abstract proposition which binds the House to that which I believe every member is at perfect liberty to affirm, and therefore, on the part of the Government, I am very willing to accept it.

Mr. D. Dalrymple: I desire to address myself shortly to two points only which arise out of the resolution of the honourable member. The necessity for obtaining a softer and a better water for the purpose of supplying London has been, in my opinion, enormously exaggerated, and when the Thames is properly purified I have no doubt whatever that it will supply a sufficient quantity of good and wholesome water. I this morning attended a committee which has granted power to a large London company to go still higher up the Thames in order to avoid possible impurities that may be poured into it; but nothing can be more erroneous than the deductions which are drawn from statements with regard to the purity or impurity of water. The idea that very soft water is good for nothing except the laundry or the tea-maker I am prepared, upon very good sound physiological grounds, to assert is not correct. I do not mean to say that the deduction the right honourable member for the University of Oxford declined to draw from his statement with regard to hardness of water and mortality is absolutely correct, but I maintain this to be a simple fact, that in fifty or sixty of the largest towns of this country exactly in proportion as the hardness of the water decreased the mortality has increased. In towns where the average degree of hardness has been 16 per cent. the mortality has been 21, and in those towns and districts where the average hardness has been only $1\frac{3}{10}$ per cent. the mortality has been 28 per cent. I pass for a moment to the question of constant supply. I find, on referring to the tables which have been before the House, that in London one-third of the houses supplied by the eight companies are under £20 a year rental, and more than one-half of all the houses supplied are rented at less than £30 a year. Now I believe that the solution of this great and important question is not to adopt a gigantic scheme which would cost the metropolis millions of money, and which would make, I will not say the fortune, but the reputation of the persons connected with it, but to trust to the companies, who have done much to improve the supply, and are still spending large sums for the purpose—to trust to them to give the lower class of houses the requisite supply upon the constant system. Consider what must necessarily take place if you put all London upon a constant supply. Let members reflect for a moment upon what takes place in their houses from half-past seven till ten o'clock in the morning on any given day; there is a rush upon the boiler, upon the bath, and upon other services, which demands a very large supply of water, and if all the houses of London, of the middle and upper classes of houses more especially, were to make that rush upon one main during those hours, no company in or out of London could give them a sufficient supply. During the rest of the day, no doubt, the supply would be more than abundant; but between those hours no main would supply as much as is wanted. I think it probable that the House will come to the conclusion that it is incumbent to furnish a constant supply to all the poorer class of houses, and to leave those that have an abundant supply, and have no want at the present moment, to the supply they already possess. The function of a water company is not to be the water police of a great city, but simply to be the means of supply. It is the business of the water companies to bring the water to the point whence it is to be delivered into the house, but the question of how it was to be distributed in the house is not their business. I think it is better for the lower class of houses that indestructible pipes should be put down, and it is the duty of the owners of property to do that. After this discussion, I hope we shall be content with simply calling upon the existing companies in London to do that which the House has a right to demand, but I hope we shall not be led by high-flown ideas, either medical or chemical, to rush into a stupendous expense such as that proposed by the honourable member for Hastings, and which I believe would only result in failure.

Mr. A. W. Young said they had had a satisfactory discussion for the last three hours. If the first part of the resolution meant anything, it meant that the present supply of water to London was not derived from pure sources; but the evidence given before the various committees and commissions did not prove anything of the sort; and he was not prepared to affirm by his vote that which he did not believe to be true. With regard to the second part of the resolution, he thought it should again be referred to a committee to consider. He believed that as respected the occupiers of the higher class of houses, they would consider it an intolerable nuisance to have the constant service forced upon them. At the same time he believed there were great advantages in applying it to the lower class of houses. He did not think he should have risen but for an observation made by the seconder of the resolution, who complained of the *vis inertiæ* of the companies in respect to improvements. Now, as respected one company, he could state that they drew their supply for many years from the Thames at Hungerford Bridge, and then at a great expense, paying a large sum annually, they removed their works to a higher part of the river, and they

subsequently spent £40,000 for the purpose of obtaining the water some dozen miles still higher up. He did not think it right, therefore, to charge the companies with *vis inertiæ* in the matter of improvements, seeing that they expended these large sums of money to improve their sources of supply, although they would obtain no increased revenue in return for that outlay. The water companies of London had got no more than a fair return for their capital.

Mr. STEPHEN CAVE: The honourable member who has just sat down has reflected very much the opinion of the House. I think the House has been placed in considerable difficulty by the Home Secretary having assented to this motion. There is no doubt that the water supply of London ought to be derived from as pure sources as possible, but the question is whether the present supply is not for all practical purposes from pure sources. Then we have heard from high authority that if we have the water driven into our houses on the constant system the pipes in a great number of the houses would be totally insufficient to bear the pressure. Therefore, to agree to a motion of this kind might lead to dangerous consequences. At the same time I should be sorry to negative it. I think the House would do well to remain content with the discussion that has arisen, and that it should for the present postpone giving a decision on the subject, and therefore we should say it is a question that ought not to be put. I beg to move the previous question.

Mr. M'CULLAGH TORRENS seconded the amendment. Notwithstanding the many instructive speeches they had heard, no opportunity had arisen for any of those who represented the ratepayers of the metropolis to be heard, even for a moment, on this question: and, seeing that it so vitally affected their interests, they ought to have that opportunity before the House came to a decision. But there was one thing which his experience in that House had taught him, and that was the danger of passing general abstract resolutions; and this was especially the case when the resolution was on a subject on which no half dozen gentlemen that he had the pleasure of conversing with upon it were agreed. A gloss had been put on the resolution by the Home Secretary, and if they passed the resolution they would have people saying to-morrow that the House of Commons had condemned the present sources of supply, and the inadequacy of the present sources of supply, as well as decisions so carefully framed by committees of the House, more than one of which had investigated this subject, not empirically, but by the light of scientific and practical evidence. He might venture without presumption to remind the House that he was the only member now present, and he believed the only one who was now a member of the House, who sat on the committee on whose report the Act of 1852 was passed. That committee comprised men who were great ornaments to that House—men whose business qualities were certainly never surpassed in that House—the present Duke of Somerset among the number; and after 40 days consecutive sitting, and after the examination of numerous scientific and other witnesses, they came to the conclusion that the Thames afforded one of the best sources of supply. This resolution was a virtual censure on the proceedings of that committee, because they had been told by the supporters of it that the Thames was an unfit source of supply. He believed that was a mistake; he believed that the water of the Thames was capable of being made a perfectly healthy and useful source of supply. He would give the House an illustration from memory of the lengths to which people would go on this subject. One of the witnesses called before them to impeach the supply of water by one of the companies—he thought it was the Lambeth Company—told the committee that the people of London were in process of being poisoned by that water. They listened to his evidence, and at last drove him to this, that a man came to his shop and had a glass of the water, and before he left his shop he died. He confessed he felt some difficulty in keeping his countenance while he cross-examined this man. He asked him, "What brought the man to your shop?" and the witness said: "He was a patient in the habit of coming." "And are people in the habit of coming to your shop without a disease?" "No, he had a disease." "What disease was it?" "He had schirrus of the pylorus." The unfortunate man had, in fact, died of cancer in the stomach. They should then, he thought, be careful not to pass an abstract resolution of this kind on the eve of sending a bill on the subject to a committee. They ought to be very careful not to lead members of that committee to a foregone conclusion. Why, on that committee of 1852 they had a scheme brought before them similar to that propounded by the honourable member for Hastings. The late Mr. Hope had a favourite idea that the water supply of London should be taken from the chalk at Watford, and Mr. Hope Scott introduced the subject in a long speech, in which he said that the water had fallen from Heaven about the year 1868, that it had since percolated through the chalk slowly, and that it was now—to use his own words—"prime old water." In a matter which affected the lives of millions, he did not think that the House should rashly restrict itself to any particular plan, and therefore he hoped the honourable gentleman would not press his motion.

Sir J. LUBBOCK said several eminent chemists, and amongst them Drs. Graham, Hofmann, and Miller, had stated that the water of the Thames would be fit for consumption by the inhabitants of London provided means were taken to exclude sewage matter, and ensure perfect filtration; but as it was practically impossible that these means could be adopted, these reports in reality condemned the use of Thames water so far as human consumption was concerned. It was an admission that this water was not a proper source of supply for this great metropolis till these measures were taken. The honourable member for Hastings had in reality understated his case. He said he did not know whether organic germs could be carried down seven miles and still retain their vitality. He knew they could be carried down 70 miles without losing life and vitality. It was true that boiling would diminish the hardness of London water, but it was a question whether it would not be cheaper to do so by Clark's process. He believed there were no two opinions on that point. It had been objected that to take the water from the chalk formations would be to exhaust the rivers on the surface of the district; but if so much water was to be abstracted every day, it did not much matter whether it was taken from the matter under the chalk, or from the rivers on the surface. He had no wish to say a word against the water companies. He believed they did their best. Their case had been fairly and temperately stated that evening, but he believed it would be found a matter of considerable difficulty to purify the waters of the Thames and the Lea so as to render them fit for drinking purposes.

Mr. CAWLEY said he entirely concurred in what had been stated as to the impropriety of passing abstract resolutions, and he should vote for the previous question if it were pressed; but, at the same time, he was convinced that a constant supply of water was indispensable to the population of London. He would not go into details, but would only say the fault of the water supply did not rest with the water companies, but in the arrangements of the houses supplied. By constant supply he meant water constantly in the mains. In the case of houses with cisterns the difficulty was capable of an easy solution, but in the case of the poorer houses some control was required. With regard to the purity of the supply, he believed that Thames water might be rendered unobjectionable.

Mr. KAY-SHUTTLEWORTH said there were some things stated in the debate to which he should like to have replied, but considering the kind manner in which he had been received, he would not occupy the time of the House any longer. He should be quite ready to withdraw his motion, being satisfied with the discussion which had taken place, but should take an opportunity of raising it on another occasion.

Mr. HARVEY LEWIS thought it very undesirable to occupy so much of the time of the House in the discussion of abstract resolutions. He should vote for the previous question.

Mr. CRAUFURD objected to the withdrawal of the motion.

Mr. KAY-SHUTTLEWORTH said that in that case he should have great pleasure in voting for the motion of the right honourable gentleman (Mr. Cave).

The SPEAKER then put the previous question, which was carried, and the resolution was therefore not put to the House.

TUESDAY, MAY 23.

The CLEVELAND WATER Bill was read a second time, and committed.

The LAMBETH WATER Bill was reported.

ALLIANCE AND DUBLIN CONSUMERS GAS Bill.—Sir Frederick Williams and Mr. Bolckow were substituted for Mr. Bowring and the Earl of March, as members of the Select Committee on this bill.

METROPOLIS WATER BILL.

On the order of the day for the second reading of this bill,

Mr. CRAUFURD said it was impossible to deal with this bill without a full discussion. It was a Government bill, and the Government had chosen to put it down on a private members night. When the bill came on he should bring forward the question whether as a matter of order the bill could be proceeded with at all this session. It was impossible to have a bill of this magnitude, which had been kept on the paper for months, against the remonstrances of those who took an interest in it, discussed at that hour of the night. The Home Secretary had promised that they should have an opportunity of a full discussion, but he had not fulfilled that promise. He thought they had not been fairly treated by the Government, and under these circumstances he would move the adjournment of the House.

Mr. KAY-SHUTTLEWORTH said he hoped his honourable friend would not press his motion. He thought the bill should be referred to a select committee.

Mr. Alderman LAWRENCE thought the honourable member for Ayr was fully entitled to demand a full discussion on this bill. But it was not merely the honourable member for Ayr who was to be considered. The bill affected the metropolis, and although it was understood that the water companies and the public had settled and arranged the terms on which the water companies were to be deprived of their property, and he understood they were perfectly satisfied with the terms proposed, it was but fair to the large number of people interested that there should be a full discussion. The discussion on the motion which the honourable member for Hastings brought forward was most interesting, and no doubt good would arise from it, though he did not carry his motion. This bill affected three millions of people, and ought not to be read a second time without discussion.

Mr. BRUCE rose to order. He had not moved the second reading of the bill, which was being discussed without any motion.

Mr. Alderman LAWRENCE said it was not his intention to discuss the bill. The question was the adjournment of the House. He was only expressing the feeling of other metropolitan members when he said the bill ought not to be brought on now.

Mr. W. JOHNSON hoped the House would not agree to the motion of the honourable member for Ayr.

Mr. BRUCE said in the face of this opposition it was impossible for him to proceed with the second reading of the bill that night, which he deeply regretted. The bill would enable them to attain that which was a great desideratum in the metropolis; but at that hour of the night [after one o'clock] the opposition of the smallest minority was effectual.

Mr. GOLDNEY hoped the honourable member would withdraw his motion, but that the Government would let them have one discussion to show the sense of the House, and that they were in earnest on this great social question.

Mr. CRAUFURD said if the bill were postponed he would withdraw his motion.

Mr. CLAY hoped the House would permit him to say, in justice to the water companies, whom he in some sense represented, that any arrangement by the Government with the companies for the companies to sell——

The SPEAKER remarked that the honourable member could not go into that matter.

Mr. CLAY would simply say, then, that the Government and the companies had not made any arrangements whatever.

The motion for adjournment was then withdrawn, and the second reading was postponed till Thursday, the 25th of May.

THURSDAY, MAY 25.

Mr. BRUCE, in moving the second reading of this bill, said: This bill was originally introduced by my honourable friend, the Secretary to the Admiralty, but as at that time he did not offer any explanatory remarks, I feel it my duty very briefly to explain what are the objects of the bill. I may say that there will be the less necessity for my going into detail, as it is my intention to move that the bill should be referred to a select committee, that committee to be partly selected by the Committee of Selection, and partly to consist of members selected by the House. But I may say that the prime and principal object of the bill is to secure a constant supply of water for the metropolis instead of the intermittent supply which is now given. Wherever the supply of water is under the management of the local government in our great towns the water is supplied on the constant system. So long ago as the year 1846 the Board of Health, acting for London, pointed out in the strongest language that not only was the supply deficient, but that the water consumed by the population was of exceeding bad quality. I might, if I were not reluctant to do so at this time of night, detain the House long by evidence in support of these allegations. In consequence of that report, and of inquiries directed by Parliament, an Act was passed in 1852, which made great improvements in regard to the supply of water in the metropolis, and among other things provided that the water should be constant whenever a certain proportion of the population should require that it should be so. Unfortunately that proportion was so large as to make that provision of the Act of no effect. The application was to be made by four-fifths of the inhabitants to be supplied, and I need not say it is impossible to get so large a proportion as four-fifths to agree on any subject. In 1867 a select committee of this House sat on the subject, and reported that a constant supply of water was necessary for the health of the population. Again, when a Royal Commission was appointed to consider the subject of the supply of water to the metropolis, that committee reported that in their opinion a constant supply was necessary for the health and well-being of the inhabitants of the metropolis. The reason why the Government did not bring in a bill founded on that recommendation was, that they were in hopes to introduce a measure for the local government of the metropolis, which would have enabled that body to deal with these questions. But such a measure was necessarily deferred, and it was then for the Government to consider whether this matter should be postponed till a measure of so difficult a character could be carried. The effect of waiting for such a measure, even if it were carried next session, would be to postpone this great good to the metropolis for at least four or five years. The bill would have to be passed—the body would have to be constituted—it would require time to consider what duties it had to perform, and when it had determined to deal with the water question it would have to give the requisite notices, and by the smallest computation four or five years would be necessary to deal with the question. Under these circumstances the Government thought it right to deal with the water at once. The bill provides that on certain applications—I need not specify what—to the Secretary of State, where he is satisfied that the need for it exists, the company shall be called upon to furnish such districts as he may determine with a constant supply of pure and wholesome water. One of the most difficult

questions connected with the supply of water is the enforcement of those regulations which are necessary to prevent the waste of water. Now very great experience of this matter has been accumulated. Those who are acquainted with the history of the supply of water in Manchester will know the great difficulties which the corporation of that city had to encounter. But at last they attained complete success, and the result has been that not only has every house been properly supplied, but that there has been, with that, a very great economy of water. I may say that such is the result of these improvements that during the 16 years the system has been in operation, although the population has increased rapidly, the economy that has been effected by these careful appliances has more than supplied the wants of the population. Well, the bill as it now stands provides that these regulations shall be made by the Metropolitan Board of Works, and approved ultimately by the Secretary of State. To that great objections were made by the companies, and I am bound to say that the companies brought forward strong arguments against entrusting those powers to any one but themselves. They represented that the economical use of the water depended on the fittings being proper for the purpose, and that no one would attend to that properly but those interested in the economy of the water—namely, the companies themselves. Well, the Government have yielded to the reasonableness of those objections, and they will propose, when the bill goes before the committee, that the companies shall, in the first place, frame the regulations which they conceive necessary; that those regulations shall be, in the next place, examined by the Board of Works on behalf of the public, and in case of any objection being made, that objection shall be laid before the Secretary of State, who, on due consideration of the matter, shall decide as to the propriety of those regulations. The bill also takes security for improved filtering of the water, if that is found necessary; for although that duty is imposed by the Act of 1852, experience has shown that it is frequently neglected. Therefore the bill provides that constant analysis of the water shall be made, and that an analyzer shall be appointed by the Secretary of State. The bill also provides for the audit of the accounts. It also provides for the compulsory purchase by the Metropolitan Board of Works of the companies. The companies have objected to this system of compulsory purchase, and the Government have considered that the Metropolitan Board of Works, though a very useful body, is doubtless not the central authority to whom they should wish to entrust the possession of these great powers, and are perfectly willing to accede to the terms which, on the part of the companies, have been offered, and that is that the question of purchase shall be considered by the select committee, and that if the terms can be agreed to as between the companies on the one side and the Metropolitan Board of Works, as representing the general interest of the inhabitants, on the other, that those terms shall be fixed in the bill; but that if they cannot agree, the question of purchase shall be postponed until a system of local government shall be provided for the metropolis. In no case, even were the terms agreed upon, is it intended that the purchase shall be made at once, or until a more complete system of local government for the metropolis has been introduced. Those are the chief provisions of the bill. The Government, in endeavouring to get so great a boon for the metropolis, has not been unmindful of the interests of these great companies. The companies, I am bound to say, have exerted themselves, especially of late years, to promote the welfare of the metropolis. They have experienced great difficulties in drawing their supply from the most desirable sources. To remedy that defect Acts of Parliament have been passed, and the discussion of Tuesday night shows that great steps have been taken to remedy the evil. I hope that the bill will be referred to a select committee, thus obviating the necessity of a long discussion. I move that the bill be now read a second time.

Mr. CRAUFURD said he never heard a bill introduced by a member of the Government in a speech more completely condemning the course of proceedings adopted by the Government. The right honourable gentleman told them they were to read a bill a second time, which was not the bill he intended to send to the committee. Now, he asked, was that a proper way of treating the representatives of the people in a matter of public interest? This bill had been on the table ever since the 16th of February. It bore the name of his honourable friend, the Secretary to the Admiralty, at that time Secretary to the Board of Trade, and since having become Under-Secretary of the Home Department. He believed that the honourable gentleman still held the management of this matter. Since this bill was introduced, the Government had introduced another measure—a measure for the amendment of the Gas-Works Clauses Act. That contained clauses equally as objectionable as those of this bill; but the Board of Trade, in consequence of the representations of those members of the House who took an interest in these matters, and who had particular experience and knowledge of them, adopted the course which he had frequently and earnestly recommended his right honourable friend to pursue in relation to these water companies. On the earnest entreaty of those interested in the gas bill, they withdrew that bill, and introduced a second one, having removed two or three of the objectionable provisions of the first. That bill still contained provisions which were open to comment and obnoxious to opposition, and then further consideration was given to it by the authorities of the Board of Trade, which he must say was highly creditable to that department. The President of the Board of Trade invited those interested to a free discussion, and he gave up at least two hours of his valuable time to hear the arguments of those who wished to place the bill in such a form that it would meet the necessities of the case without interfering improperly with the subject matter of the bill. The result was that all the objectionable parts of the bill were removed, and the bill stood for that night for the last amendments to be made in it without one word being said by those who were originally opposed to it, and they were prepared to pass the bill with the greatest alacrity. If the Home Secretary had followed the same course in regard to this bill, he would have been met in the same way. But this bill was attempted to be thrust down the throats of those who had resisted it hitherto, and would continue to resist it by every means in their power. They should have been met in a fair way. There was no necessity to send this bill upstairs, involving the paying of counsel to defend the interest of the companies. His honourable friend, the Secretary to the Admiralty, had intimated to him that he was going to raise the question, whether he had any right to speak on this bill. He stood there in a very peculiar position. When he originally took part with the honourable member for Boston in opposing the bill, he had no connexion with or interest in any water-works company in the kingdom. He took the matter up on the principle that he had opposed any measure that appeared to him an improper measure in its mode of dealing with the property of other persons. The same evening that the honourable member for Boston dropped his notice, he gave notice that he should move the rejection of the bill. Since then he had been elected to the direction of one of the water companies of London. But he appeared not as representing that company in the slightest degree, and he had yet to learn that, because facts and circumstances had occurred, he was to be debarred of his right, as a member of Parliament representing public interests, to oppose what he considered the objectionable parts of this bill. He had always intended to inform the House of the position which he occupied. He did not see that his position was in the least degree altered. It might be said that he was bound by the agreement entered into with the companies. He was no party to that agreement, and knew nothing of it. He said this was a most unusual and unjustifiable mode of dealing with a great question like this. This bill affected three classes of people—the companies, the consumers, and the ratepayers—and it was in the interest of the consumers and of the ratepayers that he objected to the bill. He contended that the Government were legislating in a tinkering manner, because they had not found a proper authority to take charge of the duty and responsibility which must be taken charge of by those who had to work out the bill. They had it from the Royal Commission, that a system of constant supply ought not and could not be introduced into London, unless it were under the control of a properly organized central body; and his right honourable friend knew very well that the Metropolitan Board of Works had not the confidence of the public. It had been admitted in the speech of his right honourable friend that that body was doomed, and that he is prepared shortly to abolish it, and to substitute in its place some other local government, and that he had hesitated about bringing in a bill to regulate water supply until he had brought in his local government bill. Why not wait a little longer till he had created a body that would have the confidence of the ratepayers, and who would be able to carry out the provisions of the bill for their own interests. The bill professed to provide a constant supply, but it did not provide it better than did the Act of 1852. On the contrary, it seemed to abolish certain provisions of that Act by which the poorer classes of the metropolis were ensured a cheaper supply of water. It repealed the 7th section of the Act of 1852, by which the local authorities are empowered to require the companies to supply poor people at the rate of 3d. per week, with a discount of 20 per cent. in favour of the owners. He meant to take the sense of the House on the matter. They, the consumers of London, did not believe in the constant system of supply. They believed there were certain classes for whom provision should be made for a constant supply; but he held that that was a matter of police regulation and of local government—that the local government should first see to it that the houses were properly supplied with the necessary fittings to receive the water, and then they might call upon the companies to supply the water. But there was no such machinery in this bill; on the contrary, it handed over the regulation of the fittings entirely to the companies, and left the consumers and the householders completely at their mercy. He thought the ratepayers and consumers should be protected by their own governing bodies, and not be handed over to the mercy of the companies. But they were told that this constant supply was a great boon, and they were referred to the city of Manchester. Well, they heard something about the city of Manchester on Thursday evening. They were told that the city of Manchester was unable to pay the cost of the constant supply, but that being the manufacturer of gas for the city, it was able, by applying the profit on the gas, to meet the deficiency on the water. But supposing they gave to the local authorities in London power to provide a constant supply, they had not the profits of gas-works to fall back upon as Manchester had, and, as the constant supply system did not pay, they would have to charge higher rates. Then his right honourable friend talked of the necessity of providing against waste. It was impossible to have a constant supply unless they did prevent waste, for the simple reason that in the metropolis the supply was very limited. Take the case of Glasgow. They were told that the constant supply system had been very successful there. When they were reminded of the enormous waste, they were told it did not matter; but those who talked in that manner were ignorant of the facts of the case, because he was informed, and believed it to be true, that Loch Katrine was failing, and that they had been obliged to take in another lake. He should move the adjournment of the debate if he were not permitted to say what he had to say. The Home Secretary gave them a pledge that the bill should come on for discussion, and only that very evening he had told them that he did not think there was any need for a discussion. He complained of the conduct of the Government in this matter. He had been there many evenings to discuss it, and he did not know why honourable members who were not interested in the matter should not go home to bed, and leave him and others to discuss the bill. He was bound to make his statement. They found that in Manchester the expense had been excessive, and that in Glasgow the constant system was failing, and yet in those towns they had properly constituted local authorities, who had power to deal with this matter. If the Government had acted properly, they might have avoided this expenditure. But they had chosen to deal with the water companies only, and had left the consumers and ratepayers out in the cold. Who was going to represent the public before the committee to whom the bill was to be referred? The sop had been thrown to the companies. The clauses respecting compulsory purchase had been abandoned; that was to say, in order to settle with the companies, who were considered to be very formidable, the whole spirit and foundation of the measure was to be taken away, in opposition to the recommendation of the Duke of Richmond's commission, that, in any legislation which might be proposed on the subject, Parliament should consolidate the whole water supply of the metropolis, and vest the management in the hands of the proper local authorities. This was not the mode in which a great and important question should be dealt with by that House. Where was the necessity for referring this subject to a select committee? They had a committee in 1867, and since then a commission. The question was ripe for legislation, if only properly proposed. The Government, in bringing in this bill, did not recommend it upon their own authority, but threw it down upon the table, and asked the House to make the best they could of it by sending it to a committee upstairs, where the lawyers would fight upon it, and the consumers would gain little advantage between the contending parties. The question of a constant supply was a very serious one. It would be a very proper thing to make provision for a constant supply to the smaller class of houses, of £20 or £30 in value; but could they do so without interfering with the larger householders? And were they prepared to say that, because in certain parts of the metropolis it was necessary to have a constant supply, owing to the owners of houses having neglected to make suitable provision for supplying their tenants with water, the larger householders should be placed at the mercy of the water companies, and have their fittings pulled to pieces and restored at an enormous expense? He was not prepared to submit to such an invasion of the property of this metropolis. There was no certainty and no clearness as regarded this bill. There was no distinct declaration in the bill that the constant system should be adopted, but the matter was left to be dealt with at haphazard by all the governing bodies of the metropolis. In the first place, the Metropolitan Board of Works, whom everybody distrusted, were to have the power, not of compelling a uniform system of constant supply, but of insisting on it in certain districts; and if that body did not move in the matter, then the Act was to be set in motion by certain other local authorities, of whom there were a variety, consisting of commissioners, vestries, and so on. These various bodies could only ask for a constant supply on certain peculiar and singular conditions. The application could only be made to this wonderful Metropolitan Board of Works by resolution passed by one of those bodies, and such a resolution was to have no effect, unless there were two-thirds of the members constituting such local authority present at the meeting and voted. What chance, he would ask, had the unfortunate inhabitants of London to get any advantage under this bill, when such restrictions were imposed? The bill professed to give a constant supply, and did not give it, and it imposed restrictions greater than those of the Act of 1852. That Act provided that when four-fifths of the inhabitants of a district demanded a constant supply, the water companies should give it. Had there been a single application? There had not been one. And he ventured to say that the provision of this bill, requiring two-thirds of the local body to be present when a resolution for a constant supply was passed, would be just as effectual in preventing it as the provision of the Act of 1852 was. These were the main objections he had to this bill. He thought the House had not been dealt fairly with, and that he himself had not been dealt fairly with by the Home Secretary. He was told that he wanted to stop the passing of the bill. He gave his most indignant denial to any such statement. It had been said that he endeavoured to stop discussion on the bill by moving the counting out on Tuesday. He did not wish to stop discussion on the bill,

but he thought they were going to waste a night, and they did waste a night in discussing a resolution the mover of which did not dare to divide the House upon it, and this bill was not reached till a late hour at night, and then an attempt was made to discuss the bill, which he resisted. He thought he had satisfied the House that the Government had treated this matter in a way not consistent with the respect due to the House. Already the House had shown by decreasing majorities that they did not approve of the conduct of the Government in other respects, and whether they would have a majority left them was a question which a few days might decide. This he wished to say, that if the Government wished to retain a majority, they ought not to treat their supporters in the way that they did. He would not be put down by a charge of factious manœuvring. He moved that the bill be read a second time that day six months.

Mr. J. Locke seconded the amendment.

Sir Henry Hoare moved the adjournment of the debate.

Mr. Ayrton said he thought that in three sentences he should put before the House the state of this question, and then he trusted the House would not consider it necessary to adjourn the debate. So long ago as 1852 the water companies were asked to give a constant supply to the metropolis. To that request they answered that it was impossible to do so then, but that, if they were allowed five years, they would then be able to comply with the request. Accordingly, a regulating Act was passed, which adjourned the constant supply for five years. Three or four years ago, the state of the supply in London having been called in question by this House, a committee was appointed to inquire why the Act of 1852 had not been put in operation. Before that committee the water-works companies appeared, and the inhabitants of London appeared through the Metropolitan Board of Works, and both parties were heard by counsel. After a prolonged inquiry the committee affirmed the principle of the Act of 1852, and pointed out that this constant supply had not been given, not on account of any defect in its principle, but on account of the defective details of the bill; and they recommended that the Government—standing between the water companies on the one hand, and the metropolis on the other—should be charged with the duty of introducing a bill to carry out the pledge given by the water companies in 1852, and for which the inhabitants of the metropolis had so long waited. In consequence of that report, his right honourable friend had brought in a bill to give a constant supply. They need not go into the question of purchase, because that was a matter which would have to be gone into before the committee. The House was asked to read the bill a second time, in order that it might go before a committee upstairs. In this state of things, was it possible for the House to anticipate the investigations of the committee, or to come to any conclusion as to the mode in which the constant supply was to be carried out? If the water companies satisfied the committee that there were practical difficulties in carrying out the bill, of course the committee would throw it out. Unless the committee were quite satisfied that the Act of 1852 could be carried into effect, of course no further action would be taken; but, if they were satisfied that it could be carried into effect, they would pass the bill, and then they would have to go into committee on the bill in the House, and on the motion for going into committee they would have all the materials for discussion. This was really a preliminary step, if the Government acted fairly towards the water companies. It left it as an open question, to be examined and decided by the committee upstairs in the first instance. Was it not better to adopt what had been the uniform practice of the House, and that was, that when a bill called a hybrid bill was brought forward, they should read it a second time, and send it to a committee upstairs, in order that its merits might be investigated?

Sir H. Hoare said he had moved the adjournment of the House because he thought that a subject of this importance should be brought on when it could be discussed.

Mr. Harvey Lewis seconded the motion for adjournment. Many of the inhabitants of London, he said, objected to the bill, and the question was one which required great and serious consideration.

Mr. Shaw Lefevre appealed to the House to proceed with the discussion. If the bill was to go into committee at all this year, it must go at such a time that it could be discussed. He ventured to say that the intention of those honourable members who wished to postpone the discussion was really to defeat the bill altogether. The bill might give rise to a long discussion before the committee.

Mr. Craufurd: What bill?

Mr. Shaw Lefevre: The honourable member for Ayr asked what bill. Now in one respect only had there been an important change—namely, the compulsory purchase clause. The compulsory purchase clause had been abandoned on the companies undertaking when in committee to negotiate. And there were two changes in minor matters which he would not go into now. His honourable friend, the member for Ayr, had complained of the Home Office not adopting the course taken by the Board of Trade in reference to the Gas-Works Clauses Act. Well the Home Office took precisely the same course. The water companies came to the Home Office, and his right honourable friend and himself made certain propositions on which the bill should go before a select committee.

Mr. Craufurd: No one but the water companies. That is what I object to.

Mr. Lefevre said the Government undertook to represent the interest of the public, and when his honourable friend, the member for Ayr, talked of the consumers, he ventured to ask whether he represented the consumer. His honourable friend, the member for Ayr, mentioned to the House that he (Mr. Lefevre) intended to challenge his right to speak. He never did anything of the kind, but what he said was, that if the honourable member got up to speak, he should mention the fact of his being a director of one of the water companies. Certainly it appeared an extraordinary thing that the member singled out to speak on behalf of the ratepayers of the metropolis should be a director of the Kent Water Company, and that the honourable member should try to make the House believe that he represented not the water companies, but the public. He thought he had a right to ask the House to believe that the honourable member represented not the public, but the water companies.

Mr. Collins said, some eight or ten weeks ago, he gave notice of his intention to move the rejection of this bill. He did so on the ground that it contained a vicious principle. He withdrew that notice from a selfish motive, because he did not wish to be there night after night to watch the bill, and because he had heard that the objectionable clauses were to be withdrawn. But he thought they had a right to protest against the conduct of the Government in bringing in bill after bill which contained the principle of confiscation. They had it in the case of the Licensing Bill, and now they had it in this bill, for they had a clause which said that the property of the water companies should be valued on the average of three years. Well, it might so happen that in the last three years the dividends might not have been so high as in the preceding three years, and that there might be a prospect of an increase. The Government had no right to bring in this bill, and say that they would withdraw the objectionable clause, and then propose to read the bill a second time. In addition to that, there were certain clauses to compel the companies to lay out large sums of money. It was true it was merely a metropolis water bill; but if they were to sanction the principle, it would affect railway shares and every kind of property. He was one of those who thought it desirable that water and gas should be in the hands of the local authorities, and that it was advisable to give facilities for their transfer to local authorities. But let them be just as well as generous. Do not let them make a bargain for the public which was hostile to private property. If it were right that private rights should be abolished, the public should pay for them. He had no doubt that there were valuable clauses in the bill, and that in a select committee upstairs it would be materially improved, but he hoped the House would set itself against the second reading of a bill on the understanding that the vicious principle in it should be taken out.

Mr. Dalrymple agreed with the honourable member that it was wrong to read the bill a second time at that time of night, and he agreed with him that when the Government brought in a bill, in which it was broadly laid down that a company should be bought, such a bill should be fairly put before the House, and not withdrawn by an arrangement. Had it not been for the declaration of the First Commissioner of Works, he should have voted not only for the adjournment but against the second reading; but after the right honourable gentleman had explicitly declared that not only the principle but the details of the bill were open to investigation before the select committee, he did not see why the House should not read the bill a second time. He confessed he was a little staggered by the reply of the Home Secretary to the honourable member for Hastings on Tuesday night, in which he seemed to recognize the principle of constant supply; but now it was quite clear, that if it could not be done without a great expense, they were not committed to that principle. He should vote for the second reading.

Mr. Goldney said when the honourable member for Boston spoke of confiscation he forgot that the concession of the water companies only dated from 1852. London was then divided among them, and there were two principles laid down down—one was that after five years there should be a constant supply; the other was that the companies should furnish an account of their expenditure, so that the public should know what belonged to revenue and what belonged to capital. But neither of these principles, on which the concession was granted, had been carried out. This bill was to carry out one of these principles—that of constant supply. This was one of the great social questions of the day, and when the Government were endeavouring to meet it in every possible way, it was too bad to endeavour to throw obstacles in their way. He must say that the Home Secretary and the Secretary to the Admiralty had done all they could. They said, looking at the period of the session, it was not well to waste time in discussion, but that it was better to refer the bill to a select committee to settle the details. He hoped the honourable member for Chelsea would not persevere with his motion.

Mr. Clay said during the many years he had had the honour of a seat in that House, he had never addressed it on this subject; but having for two-thirds of his life been in connexion with water companies, and being chairman of two of them, he ventured to make a protest against the present spirit of legislation. He would begin by saying that the First Commissioner of Works and his honourable friend oppcsite (Mr. Goldney) were inaccurate in saying that the companies were under obligation to give constant supply in five years. They were under obligation to give it under conditions which had never been fulfilled; and although it might be a very difficult thing to get four-fifths of any body to agree on any given point, still he thought the circumstance that there had never been any attempt to procure a constant supply was a sufficient reason for supposing that there was no great wish for it. His honourable friend talked of a monopoly. There was no monopoly. There was a sort of monopoly *quam diu se bene gesserit*, but nothing to prevent any one else forming a new company. The conditions of a perfect water supply were the simplest in the world. With regard to the quality of the water, without quoting unnecessarily either from the committee or from the commission presided over by the Duke of Richmond, it was sufficient to say that the water would compare well with that of any other town. And when they remembered that the rate of mortality was lower in London than it was in any other large town, it was fair to suppose that the supply of water from the Thames was not unwholesome. He did not deny that there was an insufficient supply in many parts of London, but that was because the companies had no power to compel people to take it up. If it were possible to have in this world all that was desired, the proper legislation on this subject would be to compel all owners of houses to take the water, to have sufficient receptacles for it, and to have efficient police regulations to oblige the occupiers of houses to keep those receptacles clean. But we could not have in this world all that we desire. He doubted whether, by any possible regulation, they could force the owners of houses to make a sufficient provision for the reception of the water. Under these circumstances, although he thought it ought not to be necessary, he was quite willing that the law should require that there should be a constant supply to small houses—that was, that the water should be given only in one way—namely, by stand-posts, like lamp-posts. That was necessary, because experience showed that if they had the fittings in poor houses, they were immediately stolen. An experiment was made by the Southwark and Vauxhall Company. A block of 99 poor houses was supplied with internal fittings for each house, at no small expense, and within a short period, within a week, the fittings of 98 out of 99 of those houses were stolen. After that, he thought no one would say that poor houses should be furnished with these fittings. But although he thought it not absolutely necessary, but the best course, to give a constant supply to poor houses, he did not think that a constant supply should be given to the large houses. It would be a great expense and inconvenience, and the supply would not be better for them than the present supply was. With regard to this bill itself, he would say nothing about the bill as it was brought into the House, because he never wished to make unnecessary complaints, and the complaints he should make were unnecessary, because a great part of the objections made by the water companies—by no means all, but a great part—had been removed, and the water companies had decidedly, through their agents, undertaken not to oppose the bill. He heard for the first time to-night that his honourable friend, the member for Ayr, was a director of a water company. He had no doubt that when his honourable friend put the notice on the paper, he had no motive but to serve the interests of the ratepayers, but as he was now a director of a water company, he was in a different position. It was with the honourable member a case of conscience, but if he were in his position, he should not continue his opposition to the bill.

Mr. M'Cullagh Torrens, as a metropolitan member, thought it hard that they should be asked at that time of night to send the bill to a select committee without first having an opportunity of discussing it. The people of the metropolis were not satisfied with the bill as it was first brought in.

Alderman Lawrence also protested against the House being called upon to give a decision without discussion. It had been treated by the Government as if it were a mere question between them and the companies. It appeared that the companies had had an astute gentleman known to many members of the House acting for them, and the Metropolitan Board of Works had had another gentleman acting for them, and those two gentlemen had come to terms. The companies were not to oppose the bill, and the bill was to be sent to a committee upstairs. The public were nowhere; they were supposed to be represented by the Government. But was there a single metropolitan member who would get up and ask the Government to go on with this bill? The compulsory clauses had been taken out at the request of the companies, but it was asserted that the three million inhabitants of London, who it was said were represented by the Metropolitan Board of Works, were to pay eight or ten millions to the companies for the purchase of this property. Certainly, this bill ought never to have been introduced in its present form without the representatives of the metropolis being consulted. The Metropolitan Board of Works had finished the embankment and other public works; they had a very large staff and nothing more to do, and they wanted something to do, and so they took up the question of water supply. He wanted to know if there were any petitions in favour of the bill; there had been numerous petitions against it,

including one presented by the sheriffs from the Lord Mayor and corporation of the City.

The House then divided, and the numbers were—

For the adjournment	57
Against it	87
Majority against the motion	30

Mr. COLLINS then moved the adjournment of the House. Every metropolitan member had voted for the adjournment of the debate, and he thought it right that their wishes should be attended to.

Mr. T. CHAMBERS, without seconding the motion, wished to say that he and his colleague represented one-seventh of the whole population of the metropolis, and he thought it hard that they should be overruled by members from the rural districts. The metropolitan public, so far as they were represented in that House, were unanimously against this bill. That a constant supply of water would be good on sanitary grounds, as distinguished from the present supply, was disputed. The very able medical officer of Marylebone denied it. Were these things to be settled without any discussion at all? But it was impossible to have a discussion at that time of night.

Mr. BRUCE said it was with a great repugnance that he pressed the bill at that time of night. It was only because he thought the fate of the bill depended on it. After the reports of the committee, and of the commission of 1868, that a constant supply of wholesome water was essential for the health of the metropolis, he put it to the House whether the Government were not justified in pressing this bill. He admitted that the metropolitan members represented the public of the metropolis, but in this matter there were other representatives of the metropolis, and although he admitted that the Metropolitan Board of Works did not constitute such a representation of the metropolis as he desired, yet they represented a great portion of the metropolis, and they supported this bill in its main principle. Under these circumstances he must press the bill.

Sir J. C. LAWRENCE remarked that this bill involved the taxation of the metropolis to the extent of from 15 to 20 millions, and protested against such a measure being brought forward without the ratepayers having a voice in the matter. He could not understand why there should be this indecent haste. Surely the health of the inhabitants of the metropolis was not suffering so materially that they must discuss this till between twelve and two o'clock.

Mr. LOCKE also urged the postponement of the discussion.

Mr. R. N. FOWLER thought it a reasonable request on the part of the metropolitan members that the debate should be adjourned.

Alderman LUSK asked what the metropolitan members were there for but to discuss any measure brought before the House, and especially what related to the metropolis?

Mr. BRUCE said, reluctant as he was to delay the progress of the bill, he would consent to the adjournment of the debate.

The debate was then adjourned until the following day.

THURSDAY, MAY 25.

The ABERGAVENNY IMPROVEMENT (No. 2); the EDINBURGH AND DISTRICT WATER; and the RICHMOND SEWAGE Bills, were read a third time, and passed.

FRIDAY, MAY 26.

The GREENOCK POLICE, IMPROVEMENT, AND GAS Bill.—The Lords amendments were agreed to.

The BURNLEY BOROUGH IMPROVEMENT, and the SOUTHPORT IMPROVEMENT Bills, as amended, were considered.

The GAS-WORKS CLAUSES ACT (1847) AMENDMENT (No. 2) Bill was considered in committee, and reported, and, as amended, to be considered on Thursday, June 1.

The METROPOLIS WATER (No. 2) Bill was presented, and read a first time.

The ALLIANCE AND DUBLIN CONSUMERS GAS Bill.—Thursday, the 8th of June, was fixed for the consideration of this Bill in committee (instead of Monday, June 5, as previously appointed); and Mr. Gilpin and Mr. Coleman were substituted for Mr. Norwood and Mr. Ward Jackson as members of the committee.

METROPOLIS WATER BILL.

On the order of the day for resuming the debate on this bill,

Mr. BRUCE said he had been anxious to press forward this bill in order to secure a constant supply of water for the metropolis. The question as it affected the companies was in his opinion of secondary importance. At any rate, he quite agreed that there was now in existence no public body to whom the powers of the companies could with advantage be transferred. He should, therefore, recommend his honourable friend, the Secretary to the Admiralty, to withdraw this bill, and ask leave to introduce another with the entire omission of the purchase clause from the companies. At the same time opportunity would be taken of introducing those amendments to which he referred last night.

Mr. CRAUFURD said he could only express his satisfaction and tender his thanks to the right honourable gentleman for the course he had taken.

The order on the bill was then discharged.

THURSDAY, JUNE 1.

The ILKLEY LOCAL BOARD Bill.—The Lords amendments were agreed to.

The KILMARNOCK MUNICIPAL EXTENSION AND IMPROVEMENT Bill, and the LAMBETH WATER Bill, as amended, were considered.

The NORTHAMPTON IMPROVEMENT Bill, as amended, was considered, and amendments made.

The STAVELEY WATER Bill was read a second time, and committed.

METROPOLIS WATER (NO. 2) BILL.

Mr. BRUCE moved that this bill be read a second time.

Mr. CRAUFURD said he supposed this bill was intended to be sent to a committee upstairs. He hoped that the chairman of the committee would be selected by the Committee of Selection, because it was important that they should have some one in the chair in whom the parties interested had thorough confidence.

Mr. BRUCE said he was hardly prepared to accept that proposition. The committee would be a hybrid committee, appointed, five by the committee and five by the House. The chairman would be selected by the committee itself.

The bill was then read a second time.

FRIDAY, JUNE 2.

The METROPOLIS WATER (No. 2) Bill was read a second time, and committed to a committee of ten members, five to be nominated by the House, and five by the Committee of Selection.

GAS-WORKS CLAUSES ACT (1847) AMENDMENT (No. 2) Bill, as amended, was considered.

The BURNLEY BOROUGH IMPROVEMENT Bill was read a third time, and passed.

The SOUTHPORT IMPROVEMENT Bill (Queen's Consent signified) was read a third time, and passed.

Legal Intelligence.

COURT OF CHANCERY.

TUESDAY, MAY 23.

(*Before the* LORDS JUSTICES OF APPEAL.)

SAWYER *v.* THE PETERBOROUGH GAS COMPANY.

This was an appeal on the part of the company against the decision of the Master of the Rolls, pronounced on the 8th day of December last in favour of Mr. Sawyer, decreeing a rectification of the agreement made with him for the purchase by the company of his (the plaintiff's) gas-works, by making interest payable from the expiration of nine months from the date of the agreement upon the two instalments of purchase-money, agreed to be paid at the expiration of 17 and 24 months from the date of the agreement.

The appellants contended that the Court of Chancery had no power, under the circumstances of the case, to make any such alteration in the agreement, and that, if any mistake were made by Mr. Sawyer, or his solicitor, in having settled the agreement as it was finally executed, it could not now be rectified as against the company, comprising as it does numerous shareholders, who have joined the company on the faith of that agreement. Sir R. PALMER, Q.C., Sir R. BAGGALLAY, Q.C., and Mr. C. PLUMMER appeared for the appellants; and Mr. JESSEL, Q.C., and Mr. EVERITT, for Mr. Sawyer, the respondent.

Mr. PLUMMER opened the appellants case at some length, and was followed by Sir R. PALMER. After Mr. JESSEL and Mr. EVERITT had been heard for the respondent,

Lord Justice JAMES said: In this case the Master of the Rolls has arrived at the conclusion that there really was some concluded agreement between these parties, of which the written document is an inaccurate transcript. It appears to me that there really never was anything which in point of law could be alleged to be a concluded agreement until that document was sanctioned by the board of directors on the 9th of December, 1867, and their common seal affixed to it. I agree that, in all probability, there was a mistake made on the part of the plaintiff. Of course it has been contended on the part of the defendant that there was no mistake at all, but I think the probabilities are that the plaintiff and the plaintiff's solicitor did somehow or other, in sending the thing backwards and forwards, writing it first in black ink, and then in red ink, and then in blue ink, let slip out of the ultimate document which they submitted for approval something which if they had been more careful they would have seen was not exactly what they intended. But at the same time, it was always a negotiation; there never was a moment of time at which it could be said that both parties by themselves or by their agents were at one upon all and every the terms and term of a contract, and until persons are at one upon everything that is the contract, of course there is no contract at all, and either party is at liberty to recede from it and give it up. I am of opinion that what took place at that interview between Mr. Percival and Mr. Rutland is really very accurately described by Mr. Percival himself—that is to say, "He brought me the red ink alterations. I went and consulted with the plaintiff upon it, and then the plaintiff allowed me to assent to some of the alterations. Then I afterwards put it in blue ink, and in doing it in blue ink I really made a mistake." However, the blue ink was what he sent in to Mr. Rutland for perusal, and when Mr. Rutland, who, on behalf of the company, might have said, "No, I will do nothing of the sort," perhaps may have thought he had got an advantage (but that is not the basis of this bill), and may have said I will assent to these terms, and thereupon he sends a letter to Mr. Sawyer's solicitor, saying, "I will accede to the alterations you have made except one little thing, which I have altered myself," and which the other man then assents to on his part. That being so, the document is copied and submitted to the directors, who are the only parties that can adopt it. It is true that under certain special circumstances an agent may enter into a negotiation on behalf of an incorporated company of this kind, but that is not the common course of business, and what was done here was that the directors sanctioned it. And there was the more reason for treating it here in that way, because it was not merely between the plaintiff and the company, but between the plaintiff, the company, and certain sureties. Supposing the thing had been made out in favour of the plaintiff as to the mistake, I should have found very great difficulty in knowing how the thing could have been altered at all after a third party had been induced to join it, and the plaintiff had had the benefit of that party joining it on the terms upon which alone that third party did join it. However, I proceed on the ground that in my judgment there never was any concluded agreement at all except the written document, and there being nothing but that, of course there is nothing by which the written document can be rectified. This bill proceeds entirely on the common mistake of both parties and that common mistake has not been made out. Therefore I think the decree of the Master of the Rolls ought to be reversed.

Lord Justice MELLISH said: I am of the same opinion. It appears to me clear that the written document which was sealed by the company cannot be rectified so as to make it in accordance with the previous agreement, unless that previous agreement has been proved. If there has been simply a mistake in drawing up the terms of the written agreement, that might be a ground for saying that the parties should not be bound by it, but unless there was a binding agreement this court has no power to bind parties to an agreement which they have never made. Now I am of opinion that on two grounds there never was any final agreement. In the first place I do not think the directors authorized Mr. Rutland to make any final agreement at all to bind them, but I think they merely authorized him to act as a negotiator; that is to say, to arrange the terms upon which they should purchase. But that was all to be subject to their confirmation. That appears to me to be the fair result of the resolutions of the board of directors, which is the only proper way by which a board of directors can act, and I am not aware that there is any evidence that the board of directors ever came to any other resolutions than those which are entered in the minute-book. There were one or two previous resolutions which were immaterial, but on the 2nd of December, 1867, they resolved—"That the following gentlemen form a deputation to attend upon Mr. Sawyer and his solicitor, and any others he may wish to have present, if Mr. Sawyer be disposed to meet such deputation, for the purpose of discussing terms on which he would be willing to dispose of his works to this company, and that the solicitor take steps for such purpose, namely, Mr. John Miller, Mr. Glover, Mr. Chamberlin, Mr. Taylor, and Mr. Searjeant." That was simply for the purpose of discussing terms. Then, on the 6th of December following, "The deputation appointed at the last meeting attended and reported the result of the interview with Mr. Sawyer and his solicitor. The agreement as furnished by Mr. Sawyer's solicitor was read, and the solicitor was instructed on certain points in reference thereto." Can that be constituted into saying he was authorized to make any final agreement so as to bind them, remembering that that was a most serious matter for the starting of the company, and it was plainly the duty of the directors not to assent to any terms which they had not in writing before them, and did not thoroughly understand? I think it would be very wrong to infer from their simply passing a resolution that their solicitor had instructions from them how he was to conduct the negotiation, that they had given him power finally to conclude the agreement. Then the next minute is, "At a meeting of the directors, held on the 10th of December, 1867, the solicitor produced the agreement between Mr. Sawyer and the company for the sale of his works, as it had been finally settled between them. Proposed by Mr. Chamberlin, and seconded by Mr. Searjeant, and resolved, that the agreement with Mr. Sawyer in duplicate now produced be sealed with the company's seal as a party thereto." I think there was nothing to bind them till the agreement came. But, secondly, even if Mr. Rutland had had power to make a final agreement, and bind them, I am of opinion that there is no sufficient evi-

dence that he actually did so. The fact is neither the bill of complaint nor the evidence of Mr. Percival point to any evidence of a final agreement. On the contrary, the case the plaintiff sets up all along is that when Mr. Percival got back the alterations in red ink from Mr. Rutland, and communicated the substance, that is to say as to the extension of time, to the plaintiff, and afterwards saw Mr. Rutland upon it, the final conclusion according to the bill and Mr. Percival's evidence was that he was to go over them and make final alterations and return them again. Accordingly he did go over them, and altered them, and introduced a material alteration in favour of the plaintiff, namely, as to his being at liberty to carry on the business if the first instalment was not paid on the day. He introduced that in blue ink, and forwarded it to Mr. Rutland, as appears from his own evidence, for the purpose of getting his assent to it. Mr. Rutland goes through it again, and he returns the agreement with again some trifling alterations, but saying as to all the other matters he assented to them. But, then, what he assented to was the alteration as finally made, and I cannot see that there is any evidence that Rutland ever finally entered into any agreement of which there was one clause that interest was to be paid from the date when the first instalment was to be paid, and not as was contained in the agreement, that interest was only to be paid from the date of the agreement. I am, therefore, clearly of opinion that there was no agreement entered into at all binding on the company, or even an agreement entered into by Rutland, till the time when the final agreement was assented to, and the seal put to it by the directors. The consequence appears to me to be that the only possible remedy the plaintiff could have, even assuming that he made a mistake, and even assuming that they improperly and inequitably took advantage of that mistake, it seems to me in the highest way his case could be put that the only remedy would be to be freed from the agreement. He could not have a remedy to enforce on the company an agreement which it appears to me the company have never entered into. I think their case is strongly confirmed by this. The directors say they always understood from the beginning that the agreement was as it professes to be. The shareholders say, "It was communicated to us, and was brought before Parliament, and we took our shares on the faith that this was an agreement which was binding between the parties." I am of opinion, therefore, that the bill should be dismissed.

Lord Justice JAMES: But I think without costs. The impression on my mind, unless you remove it, is that it should be without costs.

Mr. JESSEL: You have got off the interest.

Lord Justice JAMES: I think it must be so, looking at the documents.

Sir R. BAGGALLAY: Well, your lordship sees we do not get the costs of the appeal. We have had to try the question twice over.

Lord Justice MELLISH: I think they understood it, and took advantage of it.

Lord Justice JAMES: My impression is that Mr. Rutland wrote back very quickly to assent to that.

Sir R. BAGGALLAY: I am afraid the costs of the suit will amount very nearly to the amount in dispute. Your lordship sees the Master of the Rolls did not make us pay the costs.

Mr. JESSEL: He never does in a case of mistake.

Lord Justice JAMES: No; it must be—Bill dismissed without costs.

Miscellaneous News.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

The Ordinary Annual Meeting of the Shareholders of this Company was held at the London Tavern, on Friday, June 2—W. NICOL, Esq., in the chair.

The SECRETARY (Mr. E. P. Rowsell) read the notice convening the meeting, and the following report and statements of account were presented:—

The directors have the pleasure to present the proprietors with the balance-sheet and accounts for the twelve months ending the 31st of March last.

It will be seen that, after providing for interest on debentures and dividend (7 per cent.) on the preference shares, the balance remaining to credit of general revenue will allow a dividend on the ordinary shares at the rate of 5 per cent. for the year, and the directors therefore recommend a dividend of that amount.

The several stations continue to make progress, but there is no special feature to report.

To meet debentures falling due, also a deficiency of capital, it is necessary to raise £10,000; and the directors will submit to the extraordinary general meeting a resolution authorising the issue of debentures for the amount.

The directors retiring by rotation are W. G. Lysley, Esq., and E. Crosley, Esq., who are eligible for re-election.

The auditors, Henry M'L. Backler, Esq., and J. Le Geyt Daniell, Esq., also retire, and are also eligible for re-election.

General Balance-Sheet, March 31, 1871.

Dr.				*Cr.*		
To Capital—				By Preliminary expenses (balance)		£1,214 0 8
£5 per share on 15,000 ordinary shares	£75,000 0 0			Outlay at the stations		122,199 13 8
Less discount on shares authorized, 1868	3,000 0 0			Sundry accounts (balance)		716 0 5
	£72,000 0 0			Suspense accounts		262 18 5
£5 per share on 6000 preference shares	30,000 0 0			Furniture, London office		94 15 1
		£102,000 0 0		Goods in transit		2,077 14 7
Loans on debentures	34,320 0 0			Sundry debtors		6,464 16 9
Loans	1,500 0 0			Bills receivable		730 0 0
		35,820 0 0		Stocks		11,963 1 10
Bills payable		1,887 12 3		Cash		1,854 15 7
Sundry creditors		1,390 16 3				
Reserve-fund		1,205 18 9				
General revenue account		5,273 9 9				
		£147,577 17 0				£147,577 17 0

Profit and Loss, for the Year ending March 31, 1871.

Dr.				*Cr.*		
To Coal	£6,221 14 11			By Gas	£18,560 15 0	
Gas-making (salaries and wages)	2,070 6 5			Coke	2,996 1 8	
Charges on street lights	1,021 18 5			Tar	78 19 10	
Wear and tear	878 10 10			Rental of meters	379 15 10	
Lime and purifying	142 11 3			Meters	35 14 8	
Rents	46 5 11			Stock	70 1 1	
General expenses	1,180 12 8					£22,121 8 1
		£11,562 0 5		Profit on fittings sold	£50 10 7	
Fines, Trapani	£124 10 8			Rental of fittings	52 6 0	
Bad debts and allowances	57 1 6					102 16 7
Deficiency in stock	104 17 2			Transfer fees		3 7 6
		286 9 4				
Preliminary expenses and sundry accounts, instalments of		386 0 1				
London expenses		1,049 16 0				
Exchange		385 5 3				
Interest on debentures	£2,028 8 9					
Interest and discount	195 14 11					
Interest on calls in advance	14 16 0					
		2,238 19 8				
Income-tax		82 19 8				
Ditto, at Trapani		48 18 9				
Revenue		6,187 3 0				
		£22,297 12 2				£22,227 12 2

General Revenue Account.

Dr.		*Cr.*	
To Dividend account—		By Balance from last account (after payment of dividends)	£436 6 9
Payment on account on preference shares, in December, 1870	£1,050 0 0	Profit and loss	6,187 3 0
Reserve-fund	300 0 0		
Balance (for dividend)	5,273 9 9		
	£6,623 9 9		£6,623 9 9

The CHAIRMAN, in moving the adoption of the report, said the directors had very little of a special character to lay before the shareholders. The various stations of the company were making what the board hoped might be considered satisfactory progress, and, in fact, the result of the last year's working would have justified the payment of another half per cent. dividend, had not the directors thought it was unwise to divide more than 5 per cent. at the moment they were asking the shareholders to authorize the raising of further money on debentures. The only exception to the general increase of business was at Corfu, and the falling off there was so slight as scarcely to be worth notice. Even at Corfu the returns were sufficient to yield about 5 per cent. of the profit which had been earned during the year. Of course all the stations were not equally prosperous. Those in Sicily suffered from the heavy taxation to which they were exposed, and the desolating war in the north of Europe had also affected them as well as the others. The company had also some difficulty in obtaining payment from the authorities, and were obliged sometimes to threaten them with legal proceedings. However, as they became more accustomed to gas, and could better appreciate its value, it was to be hoped they would become more punctual. On former occasions petroleum had been mentioned as a rival of gas, but latterly less had been heard about the consumption of that material. With these remarks he moved that the report be received and adopted.

Lo ALFRED HERVEY seconded the motion.

A SHAREHOLDER said the chairman had made no reference to the stations at Trapani and Marsala. It would be satisfactory to know what their condition was.

The CHAIRMAN said it would be unadvisable to give in detail the results of the working of the various stations, but he might state generally that there was no loss sustained at these places—in fact, both were yielding a profit.

Mr. LAMBERT, referring to the balance-sheet, expressed a wish that the items of which the "Stocks," £11,963, was composed had been given. He also desired to see some of the expenses of the company reduced. With a profit of only £6187 on the revenue account, it seemed to him that the "General expenses," amounting to £1180, were out of all proportion, and ought to be curtailed. Looking, again, at the quantity of gas consumed, he could not but think it was unnecessary to incur an outlay of £1049 for "London expenses" in the past year.

The CHAIRMAN said this latter item included the salaries paid. The staff of officers was very small.

Mr. LAMBERT remarked that the staff of directors was very large, and the number of members on the board might advantageously be reduced.

The CHAIRMAN said the company unfortunately were suffering from a deficiency of capital, and therefore the item of interest was large.

Mr. DODSON remarked upon the amount of interest paid. The indebtedness of the company was £35,000, and the charge for interest during the year was £2238. The directors were, therefore, borrowing on debentures at something like 7 per cent. This was not a creditable position for the company, and did not, in his opinion, speak favourably of the mode in which affairs were conducted. What prospect was there that this heavy charge would be reduced? It was important to know this, because the board were about to ask the shareholders for power to raise more money at 7 per cent. If the proprietors had confidence in the management, they ought to raise this money among themselves.

The CHAIRMAN said a considerable portion of the present debenture debt was created at 6 per cent.

Mr. BACKLER said the amount raised on debentures was £34,320, and the interest on that sum was £2028, which was about 6 per cent. The interest on the other loans was higher. If the interest on debentures had been charged, as it might properly have been, in the "General revenue account," it being in the nature of dividend, the proportion of profit on the business done would have appeared much more satisfactory.

Mr. DODSON said £195 was charged for interest on loans amounting to £1500, so that the directors were borrowing money at the rate of 12 or 13 per cent.

Mr. BACKLER said the £195 included also interest on temporary loans from the company's bankers.

Mr. LYSLEY asked whether it was not practicable to have half-yearly meetings, so that the shareholders might more frequently know the position of the company's affairs.

The CHAIRMAN said it was not advisable because of the expense it would entail in taking stocks at the various stations, so as to prepare a financial statement to lay before the shareholders.

The motion was then put and carried.

On the motion of the CHAIRMAN, the dividend recommended in the report was declared, and the retiring directors and auditor were re-elected.

The meeting was then made special for the purpose of considering the propriety of authorizing the directors to raise a sum of £10,000 on debentures.

The CHAIRMAN briefly explained the necessity for raising the amount. About £4000 of existing debentures were falling due, and required to be met. A portion of the works at Valetta would have to be renewed this year, provision for storing coal at Trapani was much needed, and other expenses would have to be incurred. He then formally moved a resolution empowering the directors to raise and borrow for the purposes of the company, at interest not exceeding £7 per cent. per annum, the sum of £10,000, and to issue debentures therefore on such terms and conditions as to the directors may seem meet, and particularly on the condition of giving the holder or holders for the time being of any of such debentures the option at any time before the date of the repayment of his or her debentures, in lieu of receiving the principal money stated to be payable by the company, to receive the amount of such principal money in ordinary paid-up shares at their par value.

Lord A. HERVEY seconded the motion.

Mr. BACKLER said the debenture debt of the company was already very heavy, and, if the amount now proposed to be added were not a small one, he should oppose it. No doubt the directors had well considered the matter, and saw the necessity for taking the step, but he thought they should give the meeting a moral pledge that, for any further capital required, shares should be issued either at a discount or at a guaranteed rate of dividend.

Mr. LAMBERT thought it was breaking faith with the present debenture-holders to pass such a resolution as was now proposed. Those of which he held some were guaranteed not to exceed £30,000 in amount, and, if a further issue were made, he felt that his security was imperilled. The directors ought to have raised the money by the issue of ordinary shares at a discount.

Mr. WHITE did not see how the meeting could do otherwise than accept the proposal made by the directors, although he disapproved of it, and would prefer that they should issue £20,000 of preference shares, and call up half the amount. They could easily have done this at 7 per cent., and no doubt the present shareholders would have subscribed for them *pro ratâ*.

Mr. LYSLEY reminded the meeting that there were £4000 of existing debentures to be paid off out of the £10,000 proposed to be issued, so that the debenture debt would only be increased £6000. For any future money required, he hoped the directors would adopt the course of raising it by preference shares.

The CHAIRMAN said he thought he might venture to say the directors were not likely to issue fresh debentures without first applying to the shareholders for permission. The question had been well considered by the board before the present proposal was resolved upon.

After some further conversation, the motion was put, and carried by a majority of 14 to 8.

A vote of thanks to the chairman and directors terminated the proceedings.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary Meeting of Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, May 30—PHILIP TWELLS, Esq., in the chair.

The SECRETARY (Mr. Albert F. Jackson) read the advertisement and notice convening the meeting, the corporate seal was affixed to the register of proprietors, and the following report by the president and directors was laid before the meeting:—

The half-yearly ordinary meeting of the shareholders has been convened, agreeably to the company's Act of Parliament, for the purpose of receiving a report from the president and directors upon the affairs of the association, and for declaring the dividend for the half year ended the 31st of December last.

During that period both the workings at the several stations and generally the business of the association, conducted with his usual unremitting assiduity and judgment by the principal superintendent, Mr. G. W. Drory, and the engineers and other officers who have co-operated with him, have continued satisfactory.

The total quantity of gas made in the half year now under consideration was, in round numbers, 2136 million cubic feet. The total quantity made in the corresponding half year of 1869 was 2025 million cubic feet, being an increase of 111 million cubic feet, or at the rate of about 5·50 per cent.

The total number of lights at all the stations on the 31st of December, 1870, was 837,373. The total number on the 31st of December, 1869, was 808,0*3, showing an addition of 49,895, or at the rate of 6·19 per cent. About 26 miles of additional mains were laid during the half year. While the rental for the last half year of 1870 was larger than for the corresponding period of 1869, the amount of profit was less. The cost of the coal was greater than in 1869. This arose from the difficulties that had to be encountered in obtaining the necessary supplies after the sudden breaking out of the late war, the effects of which are still felt, and seem likely to continue. The diminution of the profit of the period now under consideration, as compared with that of the corresponding half year of 1869, notwithstanding the increase of the rental, was, however, occasioned by the diminished price realized for the gas, as well as by the additional cost of coal. Reductions of price have been made at several stations, and, notwithstanding these reductions, the consumption of gas has in some instances been less than in the corresponding period of last year, so that the association were losers to an unexpected extent. This result, so contrary to their usual experience, was occasioned by the depression attendant on the war. The value of the secondary products—coke, tar, and ammonia—shows a very satisfactory improvement, and has to some extent counterbalanced the extra price of the coal. The new tank and gasholder at Antwerp and at Berlin, alluded to in the last report, have been completed, and the subsidiary works at Schöneberg, for which land was purchased a short time ago, will be commenced immediately. The new tank and gasholder at Bordeaux will also soon be finished. At Lille, the new works will be completed in time for the coming winter's work. At Vienna, Cologne, and Amsterdam, additions are being made to the plant. At Amsterdam, a piece of land which had been used for chemical-works, was lately offered for sale. It had buildings already upon it, which could be adapted for retort-houses and purifying-houses, with numerous sheds and sufficient space for gasholders and other apparatus, so that the uncertainty, the expense, and the delay which attend large building operations in Amsterdam would, in a great measure, be saved. The president and directors thought this a very desirable opportunity of providing a site for a subsidiary works, which they had for some time seen would be required, and they succeeded in becoming the purchasers at a price which they consider not unreasonable. A large expenditure has been necessitated by the above-mentioned works, purchase of land, extension of mains, and other enlargements of the plant. The president and directors would now, in conclusion, invite attention to the accounts, which have been duly audited, for the half year ended the 31st of December last. From these accounts the directors have, in accordance with the provisions of the Companies Clauses Consolidation Act, prepared a scheme showing the profits of the association for the last half year, and the portion thereof applicable to the purposes of dividend, which the president and directors recommend now to be declared—namely, a dividend of £2 per share, payable, free of income-tax, on and after the 15th of June next. The directors who go out of office by rotation are J. C. Palmer, Esq., Sir F. H. Goldsmid, Bart., M.P., and T. H. G. Newton, Esq. The auditor who goes out is J. Sebag, Esq. These gentlemen are all eligible for re-election, and offer themselves accordingly.

The CHAIRMAN: Gentlemen, the report which you have just heard will, I trust, have succeeded in allaying any anxiety which you may have felt as to whether the circumstances of the last six months might not have brought the directors to the painful necessity of reducing your dividend. I assure you it is with the greatest satisfaction that we, on this side of the table, feel ourselves able, with prudence and safety, still to continue the payment of the same rate of dividend that you have been receiving during the last two half years. This has not been effected without a great deal of apprehension, and certainly a great amount of attention, on the part of our officers. Fortunately, those stations which we possess in countries not disturbed by the war have shown such an increase in the quantity of gas required, as to compensate for the diminished consumption at our other stations. At the same time, though the consumption of gas has increased, the reduction in price at several of our stations had, notwithstanding the extension of our business, occasioned a large diminution in the rental, and, of course, a corresponding reduction in our profits also. The reduction in profit may partly be accounted for by the increased sums paid for coal; but on the present occasion it is not so much owing to that circumstance as to the reduction in the price of gas. During the last six months we have experienced that which we have never before known in the history of this association—viz., that the effects of a war are more than sufficient to compensate for the stimulus always provided by a reduction of the price of gas. At some of our stations where we have made a reduction in the price of gas, not only have the profit and the rental fallen off, but the amount of gas consumed has been less than it was before the reduction took place. This we can attribute to nothing but the fatal effects of the war. The quantity of gas made at all our stations together during the last year shows the largest increase we have ever had in any corresponding former period. We made more gas in 1870 than we have ever done in any previous year since the establishment of the association. This has been attended by an increase in the rental of about £30,000; but, notwithstanding that large increase in consumption and rental, the profits for the last half year are less than they were in the corresponding six months of 1869 by very nearly £10,000. Fortunately, there was an increase in our profits for the preceding half year, so that the profits for the whole of 1870, as contrasted with the profits of 1869, show a small addition, amounting to £2000 or £3000. It is a very small increase, but still it is, so far, on the right side. At the same time, in calculating the effects of the war, and looking forward to the future, we must bear this in mind, that this increased rental has not been obtained without considerable additions to the plant. We have been paying off bonds, and thereby diminishing the amount of interest to which we are liable; and we have been extending our powers of production—our means of manufacturing and distributing gas—at a cost probably of £60,000 or £70,000 during the past year. The whole of that expenditure, however, instead of increasing our divisible balance as might be expected to the extent of 8 or 10 per cent., has resulted only in an increase of £2000 or £3000. This state of things will fully justify any apprehension which may have prevailed on this or the other side of the table with respect to our power to continue on this occasion the payment of the large dividends we have hitherto kept up. Fortunately, we are able to do it with safety, and I shall be extremely glad if, at the end of the present half year, the directors find themselves in a position to offer as favourable a return as they do at this half-yearly meeting. I do not think anything very special has occurred at any of the stations with which I need trouble the meeting, but I may state that I have myself just returned from a visit of inspection to all our stations, except those at Bordeaux and Vienna. I started with the hope of getting to Vienna, but when we arrived as far as Frankfort, several circumstances made it extremely undesirable that Mr. Drory should be absent so long as the proposed visit to Vienna would require. We, therefore, changed our course and went to Berlin and Hanover. Mr. Drory was obliged to go to Cologne, and I went on with Mr. Wood to Holland, visiting Amsterdam, Haarlem, and Rotterdam, and returning home through Lille; so that, in company with one or the other of these gentlemen, I have seen all these stations within the last six weeks, and I can most honestly bear my testimony in every way to the extreme care and efficiency with which they are all conducted, and to the great zeal and diligence shown by all our engineers at every station. I think they are deserving of the highest praise. With regard to the sum left at the disposal of the directors last half year for contingencies, we spent in 1870 about £15,000 in purchasing additional land, and between £15,000 and £16,000 in paying off bonds. The remainder, between £50,000 and £60,000, has been spent in very extensive works, some at Berlin, some at Vienna, some at Lille, and some at Frankfort, while smaller sums have been laid out at other stations. I should be glad if I could report that all this expenditure had resulted in an increase of 10 per cent. upon it to our balance. However, it is not so, and I can only congratulate you upon the return being so good and so large as our accounts show. I now beg to move—"That the report upon the affairs of the association now read be received and adopted, and entered on the minutes."

Mr. WILKIN seconded the motion.

A PROPRIETOR: I am unwilling to offer any criticism upon the statement we have heard, especially as what I am about to say may appear to be a matter of detail. I observe that the chairman referred to the paying off of bonds, and I confess I do not quite understand the policy of that arrangement in an association which is in such good credit as this is. I submit whether it would not be quite as well to allow the public to have the advantage of our bonds at 5 per cent., while we can make 8 or 10 per cent. of the money.

Mr. BARBER: I should like to ask whether any proceedings have been taken with regard to the property lying dormant at Marseilles and Toulouse.

The CHAIRMAN: No proceedings have been taken; in fact, no opportunity seems to have presented itself of which advantage could be taken for the purpose. At Marseilles, all we could do would be to sell the land. The land is increasing in value every year, though possibly not to the extent of the interest we lose; but, if we keep our gas-works there at the end of the present concession, it is within the bounds of possibility we may come into Marseilles again. We are acting upon that principle both there and at Toulouse.

Mr. BARBER: I thought the report to-day would have been of a more cheerful character, but the observations of the chairman have certainly relieved the feelings of disappointment with which I listened to it, and I think it must have been gratifying to every one present to hear from him of the increase of our lights. Then, again, with regard to the total profits of the year, I think the progress of the association is extremely satisfactory. There has been no decrease in the profits of the whole year, but, as in former years, there has been again an increase. I think that is a matter for congratulation under the circumstances. Then with regard to the distribution of that profit, it is proposed to give the proprietors something over 9 per cent. upon the total share capital. To do that requires the sum of £224,000, leaving ample funds for contingencies. Under these circumstances, I was in hope that the chairman would bear in mind what he held out to us on the last occasion—viz., that the time was not very far distant when we might be able to write up half the uncalled capital of the association, and so reduce the liability of the shareholders to the same amount at which it stood before the passing of our late Act of Parliament. I do not wish to press this subject upon the directors on this occasion, I am only too glad that the report they have presented to us is so satisfactory, and hope the next half year may turn out as well. At the same time I should like to have heard a word or two from the chairman on a subject respecting which he held out some encouragement to us at the last meeting.

The CHAIRMAN: With regard to the questions that have been asked, I will just say a word or two. And first respecting the debentures. Our debentures originally amounted to about £165,000, and they are now reduced to rather below £100,000. We are endeavouring to pay them off as fast as we can. We do not press gentlemen who hold them to receive their money, but when they require renewing we decline to do it. With regard to the other question about capitalizing some of our profits, I did not refer to it in the few observations I made in moving the adoption of the report, for this reason: with the effects of a war still grievously felt by us (for we have not got over those effects, as far as the supply of coal is concerned, or the consumption of gas)—with that uncertainty, and with the reduction in the per centage of profits to rental, which is considerable—and having regard also to the fact that several of our large contracts will run out in the course of the next five or six years—I do not think we could entertain that question at the present moment. We hope that the same good fortune which has hitherto attended us will enable us to renew

our contracts on terms more or less favourable; at the same time it is a matter of uncertainty which always excites some degree of apprehension.

The motion for the adoption of the report was then put, and carried unanimously.

On the motion of the CHAIRMAN, it was also resolved unanimously—"That a dividend of £2 per share be declared upon the 56,000 shares of the association for the half year ended the 31st of December last, and that the said dividend be payable, free of income-tax, on and after the 15th of June next."

The retiring directors and auditor were severally re-elected.

The CHAIRMAN: Gentlemen, that completes the list of subjects on the *agenda*, and in ordinary meetings there would be nothing else for the directors to bring forward; but the circumstances of the last six months have been peculiar. There have been elements of disturbance and disquiet to all our engineers and agents abroad, which require more than ordinary notice on this occasion. The difficulties of procuring a supply of coal, of negotiating with railway and municipal authorities, and, indeed, the obstacles encountered in every direction, but which it is not necessary for me to detail, have borne very severely on all our engineers, without exception, at all our stations, and I am sure it will be highly satisfactory to those gentlemen if this meeting will evince a feeling of gratification at the way in which they have met and overcome those difficulties. With that object in view, I now propose—"That the best thanks of the meeting be given to the general superintendent of the association on the Continent, Mr. G. W. Drory, and to the engineers at the several stations, for the zeal and ability with which they have so unremittingly discharged their respective duties."

Mr. SEBAG: I beg, sir, to be allowed to second that motion. I have just returned from Belgium and Holland, where I visited the stations of the association, and I can bear witness to the immense zeal and energy exhibited by every member of the establishment at each of them. I am quite sure this motion, if carried, as I am convinced it will be, unanimously, is but a fair tribute to these gentlemen for the exertions they have made to meet the difficulties with which they have been surrounded.

The resolution was put, and cordially adopted.

On the motion of Mr. F. BASSETT, it was resolved—"That the cordial thanks of the meeting be given to the president and directors for their able management of the affairs of the association, and to the chairman for his conduct in the chair this day."

The CHAIRMAN having acknowledged the vote, the proceedings terminated.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN MAY, 1871.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	20·13	0·131	0·136	0·004	15·0	4·3
West Middlesex	18·87	0·021	0·136	0·000	14·2	3·6
Southwark and Vauxhall	19·57	0·124	0·118	0·003	14·6	4·1
Chelsea	19·13	0·141	0·117	0·004	14·4	4·0
Lambeth	19·57	0·136	0·146	0·004	14·6	4·0
Other Companies.						
Kent	26·83	0·014	0·238	0·000	20·0	5·5
New River	19·13	0·049	0·136	0·000	14·8	3·3
East London	18·47	0·086	0·125	0·001	13·2	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was somewhat turbid—namely, in those of the Lambeth and the Southwark and Vauxhall Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 103,593,573 gallons; and the number of houses supplied was 485,734. This is at the rate of 31·8 gallons per head of the population daily.

H. LETHEBY, M.B.

GAS EXPLOSION AT SHEFFIELD.—Residents in the neighbourhood of the Haymarket, Sheffield, were greatly alarmed on Saturday evening by a terrific explosion which occurred at the gas-works. Abutting on the street is a large shed, in the corner of which a new governor for regulating the supply of gas to the town had been fixed. Yesterday men were engaged connecting it with the street-mains. About eight o'clock the gas was turned on, a valve in connexion with the governor being incautiously left open, through which the gas poured in volumes, and quickly filled the shed and a store-room above, in which was a large quantity of oil. The gas was ignited by a fire, and exploded, the flooring and roof being blown into the air, and the premises set on fire. Two men were slightly injured, and others had narrow escapes. The houses near were shaken by the force of the concussion, and their occupants, greatly terrified, ran to a distance, fearing a second disaster. The fire brigade succeeded in extinguishing the fire in about half an hour. The scene of the disaster was visited by many thousands of people.

Register of New Patents.

1513.—CHARLES WILLIAM SIEMENS, of 8, Great George Street, Westminster in the co. of Middlesex, for "*Improvements in regenerative gas-furnaces and apparatus connected therewith for the manufacture of glass, also partly applicable to regenerative gas-furnaces generally.*" Partly a communication. Patent dated May 25, 1870.

One part of this invention has reference to an improved construction of the gas-producers of regenerative gas-furnaces for the manufacture of glass.

In working gas-producers of the form and arrangement described in the specification to letters patent, No. 167, January 22, 1861, considerable loss of effect and inconvenience in working has arisen, in consequence of the condensation of tar and soot in the flues leading from the gas-producers to the furnaces, the cause being that the carbonic oxide gas produced in the lower portions of the apparatus near the grate mixed within the flues with the volatile hydrocarbons and other vapours distilled off from the fuel in the upper part of the producer, which gases not being in a permanently gaseous condition, were thereby condensed to a considerable extent, and deposited in the form of tar and soot.

Now, the present improvements have for their object to prevent such losses of the volatile gases, by causing them, before passing into the gas-mains, to become of a more permanent nature than when first disengaged from the fuel.

For this purpose the gas-producers are constructed of three compartments or chambers, one of which contains the fuel passing down upon an inclined plane on to a grate at the bottom, and acts in a similar manner for the production of the gases as the producers described in the before-mentioned patent. Facing the inclined bed of fuel is a fire-brick wall, passing down from the top of the producer to within some distance above the grate at the bottom, which wall separates the producing-chamber from the two other chambers or compartments at the back, with which it communicates—firstly, by means of the space left at the bottom of the division-wall; and, secondly, by means of a passage connecting the top of the producing-chamber with the top of the back compartments. At the point where the passage enters these compartments a reversing valve is placed, by means of which the gas-passage is alternately made to communicate with the one or other of the back compartments, while the other compartment is at the same time put in communication with the main gas-flue. In each of the back compartments zig-zag passages are formed, the upper ends of which communicate with the gas-passage from the producing-chamber, while the lower ends communicate with the space over the fire-grate thereof. From this arrangement it will be seen that when decomposition of fuel is going on in the producing-chamber, the volatile gases distilled from the fuel at the top of the chamber will pass through the before-mentioned passage into one of the back compartments, will pass up and down in the zig-zag passages thereof, thereby becoming considerably heated, and will then issue at the bottom among the highly heated layer of fuel on the grate of the producing-chamber. By the heat to which these gases are thus subjected, they will become effectually decomposed, forming permanent hydrogen and carbonic oxide gases, which mix with the carbonic oxide gas passing off from the lower part of the layer of fuel. These mixed gases then ascend through the zig-zag passages of the other back compartment, giving off the greater portion of their heat to the walls thereof, and eventually escape into the gas-flue to the furnaces. When by this action the passages of the one back compartment have become considerably heated, while those of the other compartment have been cooled by the passage of the cool volatile gases, the reversing valve is moved so as to change the direction of communication, the cool gases being made to descend through the heated compartment while the combined heated gases pass away through the cool one. Closed apertures may be provided in the passages, in order that, should any deposit of soot or tar take place therein, these may be burnt out by the introduction of air through such apertures.

In place of establishing the communication between the top of the producing-chamber and two back compartments or regenerators, as they may be termed, there may be only one such back compartment, with or without zig-zag passages, and the volatile gases may be caused to descend in the producing-chamber to the aperture at the bottom of the division-wall, where in passing into the back compartment they come in contact with the heated fuel on the grate, and are acted upon thereby as before described.

Another part of this invention has reference to an improved construction of the heated gas and air passages or ports of regenerative gas-furnaces, for the manufacture of glass for the purpose of producing a more effectual intermixture of the gas and air on entering into combustion. For this purpose the vertical air-ports are raised very nearly to the roof of the furnace, while the side walls of the gas-flues are brought forward towards the heated chamber in a divergent manner until those of the one gas-flue meet those of the adjacent gas-flues, whereby the gas is introduced into the heated chamber below the air through channels or ports, increasing gradually in width towards the furnace, where it is met by the air passing in in diverse directions. The tops of the gas-ports are covered in to a certain extent, whereby the gas on passing up the vertical passages is prevented from passing at once up through the stratum of air coming in through the raised air-ports, the gas being deflected by the covering, and caused to pass some distance forward through the diverging ports before coming in contact with the descending stratum of air.

It will be evident that these arrangements are also applicable to other regenerative gas-furnaces besides glass-furnaces.

Another part of the invention has reference to an improved construction of and mode of working glass-pots or tanks of glass-furnaces.

1560.—WILLIAM CLELAND, of Linacre, near Liverpool, in the co. of Lancaster, manager of gas-works, for "*Improved means and apparatus for exhausting, forcing, and purifying gas for heating and illuminating purposes.*" Patent dated May 28, 1870.

This invention consists essentially in the employment of a stream or streams of steam, or of the vapour of gas liquor or of other condensable vapour at pressure for the purposes of exhausting, forcing, and purifying coal, cannel, and other gas, and as a result cleansing the apparatus used in the manufacture of gas. The said steam or vapour is admitted between the body of the retort and a condenser, or pipes, mains, passages, or parts acting as a condenser, through jets or nozzles of any desired form, in such manner as to produce a current in the desired direction, whereby the gas is conveyed away mixed with the steam or vapour, thereby relieving the retort from objectionable pressure. The mixed fluids pass into a condenser for the purpose of the conversion of the steam or vapour into liquid, the gas being cooled at the same time, and is thereby purified and improved.

The exhausting and forcing apparatus which is preferred, consists of an annular or central jet, or of several jets, placed at a contracted part or parts of the apparatus, and such jet or jets direct the steam or vapour and the induced gas into an induction piece or pieces, increasing in transverse sectional area in the direction of the current.

The purifying apparatus has its parts so arranged that the liquor from the gas is kept in contact with the gas, and flows in the same direction, for the purpose of removing ammonia and other impurities.

As steam or vapour in projection under pressure from a circular orifice powerfully tends to assume a conical form, it is advantageous, though not essential under this invention, that the outlet part of the induction piece should be of capacity increasing in the direction of the current by giving it the form of an elongated cone. The pressure of the mixed steam and gas against the interior of the induction piece, and the consequent resistance to their passage is thus diminished. It is recommended that for a short distance in front of the issuing jet of steam (the size of which jet must manifestly depend on the work to be done in exhausting and forcing, and the pressure of steam in the boiler), the induction piece should have parallel or nearly parallel sides, and that thereafter it should increase in area so that the longitudinal lines of the internal surface may form an angle to the axis of from about 5 to 6 degrees. The axis or longitudinal centre line of the steam jet, the induction piece, and the connecting main or pipe into which the mixed steam and gas flow should be identical. The diameter of the induction piece at its throat or narrowest part ought to be proportioned to the size of the main or passage in which it is placed, as well as to the quantity of gas to be exhausted and forced in a given time. One-fourth or one-fifth of the diameter of the main or passage is a convenient diameter.

Although the apparatus, with an expanding induction piece above described, is preferred, cylindrical induction pieces may be used with advantage. They are convenient for adaptation to existing works. In such cylindrical pieces the length ought to be proportioned to the diameter, and the diameter to the size of the main or passage, and the quantity of gas to be exhausted and forced in a given time. In practice it is found that one-fourth to one-fifth of the diameter of the main is a convenient size. The length of the said cylindrical piece is also important. If too short, the mixed steam and gas, under the influence of the back pressure, will eddy or return through the induction piece. If too long, objectionable friction will result. A length equal to about eight or ten times its

diameter is suitable. An arrangement of this kind, with a central jet ⅝ inch diameter, in a cylindrical induction piece 3 feet long and 4 inches diameter, for passing 50,000 cubic feet of gas per hour through an 18-inch main against a back pressure equal to a column of water 13 inches high while maintaining a steady vacuum of 2 inches of a column of water, has been successfully used.

Having ascertained that jets of steam act more advantageously in exhausting and forcing when admitted amongst cold gas than amongst hot gas, it is preferred when one jet, or a group of two or more jets, acting simultaneously, is used to admit the steam at the outlet from the ordinary or primary condenser. It will be obvious, however, such jets may be admitted at any convenient points between the retorts and the gasholder. When cumulative or successive jets are used, it is better to place one at the inlet to each of a series of purifying and condensing apparatus; or when the said purifying and condensing apparatus is not used, at any convenient points between the outlet of the primary condenser and the gasholder.

1565.—WILLIAM THOMAS SMALL, of 13A, William Street, Camden Road, Holloway, in the co. of Middlesex, gas-fitter and worker in metal, for "*Improvements in the method or methods of supply and exit of water and other fluids respectively to and from aquariums, tanks, cisterns, and other like vessels, and in the apparatus connected therewith.*" Patent dated May 28, 1870.

These improvements consist, first, of a tap or ball-tap that has a hollow ball or float at the end of the lever, the raising of which shuts the supply-valve. The supply-valve has a vertical movement, and may either consist of a ball fitting to a socket, and having a cage in which it works, or of a seat-valve, the tail-piece or spindle of which is jointed to the lever. In the case of the ball-valve, a projection from the lever presses it into its seat when the said lever is risen by the flux of water into the cistern; and when it (the lever) has attained the level for which it is adjusted, a projection from the lever may also be used to operate the seat-valve, when the tail-piece of the said seat-valve works in an upper tube.

1570.—CHARLES DENTON ABEL, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in the manufacture of wrought-metal tubes, and in machinery or apparatus employed for that purpose.*" A communication. Patent dated May 30, 1870.

These improvements consist, first, in bending the skelps preparatory to the welding of the same, or in welding such tube-skelps by drawing the skelps or tubes through dies which are automatically closed up, while the tube or skelp is passing through by means of the same power which actuates the draw-bench. Secondly, the invention consists in the construction of apparatus or machinery whereby such automatic closing of the dies is effected. By these means the employment of a tongsman is avoided, and the use of more force is permitted, with greater certainty of action than can be obtained by manual labour, resulting in an improved manufacture of the tubes or skelps.

1634.—ALFRED WILLMER POCOCK, of Pimlico, in the co. of Middlesex, engineer, for "*Improvements in meters, pumps, or other engines for water or other liquid.*" Patent dated June 6, 1870.

This invention relates, firstly, to improved arrangements of parts in double cylinder meters, or other liquid engines, whereby their construction is much simplified, and whereby they are caused to work with greater freedom or accuracy. Secondly, to a mode of insuring a smooth surface on the interior of the cylinders for the pistons to act against without the necessity of having to bore and polish the interior as is usual.

The first part of the invention consists in arranging two or more sliding valves on or to the ports leading to each cylinder, so that the valves are caused to move to and fro over the ports by eccentrics or other appliances on a rotating crank, spindle, or shaft, to which the piston-rods are connected, and so that as the upper and lower sections of one or both of the cylinders are being emptied, the other is being filled under the pressure of the head of water, the rise and fall of the pistons in the cylinders causing the cranks to turn the spindle or shaft, and thus by means of the eccentric or other appliance move the valves in regular order. The surfaces on which the valves move being by preference at an angle, and by preference at right angles to each other.

According to the second part of this invention, the inner diameter of the cylinder is made a little larger than is required when finished, and a truly cylindrical and smooth block is placed in the centre of it, leaving a space all round between them. Into this space molten metal of any suitable kind is poured, which, when cold and firmly set, is sufficiently smooth for the piston to work against without any leakage taking place. The block can be removed by hydraulic or other power. It is proposed to form recesses at the end or ends of the cylinder, so that the edge or edges of the lining metal may be kept secure.

1640.—WILLIAM WILSON, of the city of Manchester, ironmonger, for "*Improvements in and apparatus for manufacturing gas for illuminating and heating from coal oils.*" Patent dated June 7, 1870.

In the manufacture of gas from coal oils it is often found necessary to clean out the retort and pipe leading therefrom to the hydraulic or tar condenser, owing to the deposit of carbon (lampblack or coke). It is also essential to keep the coal oil or material from which the gas is made at or above a certain temperature, say to 60° Fahr., in order to make it liquid enough to pass from the cistern in which it is stored to the retort. Now this invention consists in the use and application to retorts used for the manufacture of gas from coal oils of a pipe leading direct from the retort to the hydraulic or tar condenser, the top of such pipe being provided with a water-joint or lute to allow of such pipe being cleaned out without breaking any joint, as hitherto practised. The cistern to contain the coal oils and the pipe leading therefrom to the retort are surrounded by an outer casing through which warm water is caused to circulate, supplied by a cistern, which also supplies the water-joint.

1664.—JAMES WILLIAM BUTLER, of Stonebridge Park, Willesden, in the co. of Middlesex, civil engineer, WILLIAM DAVID BUTLER, of Princes Street, Hanover Square, in the co. of Middlesex, civil engineer, and JAMES DUNBAR, of Vicarage Road, Camberwell, in the co. of Surrey, civil engineer, for "*Improvements in machinery or apparatus for supplying coal, cannel, or other substances to gas-retorts or ovens, and for withdrawing the same after distillation.*" Provisional protection only obtained. Dated June 9, 1870.

This invention relates to certain improvements upon, and modifications of the machinery or apparatus described in patent No. 1152, dated April 6, 1868; and consists in so arranging such apparatus as that the combined charging-scoops and withdrawing apparatus shall be capable of being introduced into and withdrawn from the retorts opposite which they have been brought without imparting any forward or backward motion to the carriage or cradle which supports the scoop or scoops. This may be accomplished in various ways; for example, according to one arrangement the scoop or scoops may be carried on the side of the main supporting-frame, so that when withdrawn from the retort, they will project but little, if any, beyond the front of such frame, in lieu of, as heretofore, projecting at least the full length of the retort beyond the front of the supporting-frame, whereby considerable economy of space is effected. The scoops may be worked either singly or in sets of three or more, arranged either in a horizontal or a vertical row; these sets of scoops are carried in supplementary frames which connect the scoops together, and maintain them at the proper distance apart. The supplementary frames are connected by two or more horizontal or vertical parallel levers centred either at the upper or lower ends to the main supporting-frame, or to a sliding frame carried thereby; these parallel levers have a sufficient throw to give the requisite forward and backward motion to the scoops, each scoop moreover is made capable of swivelling horizontally on its frame round a central pivot. The parallel levers may be caused to reciprocate to and fro, by means of worms and worm-wheels in combination or not with pitch chains.

The several scoops with their parallel levels, and the gearing for actuating such levers may be made capable of being raised and lowered readily in the main framing or supports of the apparatus, in order to accommodate the scoops to retorts set at different heights. This may be effected by carrying the parallel levers and their gearing in a vertical sliding frame, which is raised and lowered by means of a rack and pinion, or other equivalent mechanical contrivance. In lieu of carrying the scoops in and out of the retorts by means of parallel levers, it is proposed sometimes to effect this by means of endless chains acting upon the back ends of the scoops. The scoops are combined with rakes or scrapers, and are constructed and turned over, or reversed, so as to discharge their contents, or bring their rakes into action when inside the retorts in a similar manner to that described in the patent before referred to. The cradle is mounted upon a travelling carriage which runs along rails extending the whole length of the retort-house, so as to bring the apparatus opposite each bench of retorts.

1679.—ROBERT THOMAS YEADON JOHNSON, of Stockton-on-Tees, engineer, for "*Improvements in rotary engines and pumps.*" Patent dated June 10, 1870.

This invention consists of a cast-iron cylinder properly secured, and having cylinder covers bolted on the ends, through the stuffing-boxes whereof a central shaft passes, working in bearings, which shaft has an eccentric piston thereto rigidly fixed. Outside the cylinder is fixed a chest for steam or power fluid, containing a slot and stuffing-box, in which a division-plate travels, one end bearing steam-tight on the face of the eccentric piston, while the other is open to the action of the steam passing from the boiler to the valve-chest. The steam gives motion to the plate and to the eccentric piston, the amount of travel or motion corresponding with the eccentricity of the piston. This plate separates the exhaust from the feed. In some cases two chests and two division-plates are used.

1682.—BRISTOW HUNT, of 1, Serle Street, Lincoln's Inn, in the co. of Middlesex, gentleman, for "*An improved joint for water, gas, and steam pipes.*" A communication. Provisional protection only obtained. Dated June 11, 1870.

According to this invention, pipes are provided at each end with shoulders, forming angles between the vertical line of the one and the oblique line of the other. The caoutchouc disc or washer covers the edge of each pipe, and is stopped by the projection by which it is maintained in position during the mounting of the joint. The cast-iron collar is formed of two parts hinged together, and is provided internally with two ribs, which, while adding to its strength, compress the elastic washer into the angles, thus preventing leakage of the fluid.

1706.—BEVAN GEORGE SLOPER, of Northfleet, in the co. of Kent, for "*Improvements in the treatment of sewage.*" Patent dated June 14, 1870.

This invention consists, first, in favouring the fermentation of the sewage under treatment, for the purpose of rapidly converting the nitrogenous matters contained therein into carbonate of ammonia; and, secondly, in the employment of soluble salts of magnesia, soluble alkaline phosphates, and the soluble phosphates of lime, for the purpose of forming an ammoniacal phosphate of magnesia, and precipitating it, charged with various animal matters contained in the sewage.

1707.—GEORGE WEIR, of Glasgow, in the co. of Lanark, and JAMES WEIR, of Liverpool, in the co. of Lancaster, for "*Improvements in slide-valves.*" Patent dated June 14, 1870.

These improvements consist, first, in the balancing or partial balancing of pressure acting on the back of a slide-valve, by causing a fluid of a higher pressure to act on the under side of the valve; secondly, in the balancing or partly balancing of the slide-valves of compound steam-engines by suitably disposing three pressures to act thereon; thirdly, in the lubricating of slide-valves by admitting or forcing oil, water, or other lubricant into spaces beneath those sides of the valve-face which are at right angles to the ports.

1713.—HENRY LAW, of 15, Essex Street, in the co. of Middlesex, civil engineer, for "*Improvements in apparatus for the supply of water to water-closets, urinals, lavatories, buildings, and streets, some of which improvements are applicable to other purposes.*" Patent dated June 15, 1870.

In carrying out this invention, a cylindrical chamber is constructed having a valve with a plunger fitted therein. The rod which moves the plunger passes through a stuffing-box at one end of this chamber, and the pipe by which water is supplied to the closet enters at the other end of the chamber, and this end is so formed that when the plunger is held against it no water can pass out of the supply-pipe into the chamber. On opposite sides of this chamber are openings or ports that on the one side communicate with a service-vessel, and that on the other side with the basin of the water-closet. These ports are so placed in the cylindrical chambers that when the plunger is held against and closes the supply-pipe both ports are open, and a free communication is formed between the service-vessel and the water-closet basin, but when the plunger is moved to the other end of the cylindrical chamber, it passes over the port which communicates with the service vessel, and beyond it sufficiently to establish a communication between the supply-pipe and the service-vessel, so as to allow water to enter the latter.

1715.—ROBERT MILLER, of Gartcosh, in the co. of Lanark, N.B., for "*Improvements in the manufacture of clay or earthenware pipes, and in the mechanism employed therefor.*" Patent dated June 15, 1870.

This invention consists in providing the mouth of the pug mill or press from which the plastic clay is forced with a guide so shaped as to form the socket on one end of each pipe. A die of the shape and dimensions necessary for forming the bore of the pipe is situated in the discharging mouth of the pug mill or press, leaving an annular space thereat, and this die projects some distance beyond the mouth of the mill or press. Around the outside of the discharging mouth of the mill or press another die made in two halves is situated, and its interior shape is such that in connexion with the die it enables the socket or faucet to be formed after the body of the pipe is formed.

1729.—HENRY HERMANN KROMSCHROEDER, of 90, Camden Street, Camden Town, gas engineer, and WILLIAM PARMINGTER RANDALL, of 9, Dorset Street, Vauxhall Bridge Road, gas-meter maker, for "*Improvements in gas-meters.*" Provisional protection only obtained. Dated June 16, 1870.

The object of these improvements is to maintain a proper supply of water to the drum-case of a gas-meter, in order to compensate for the loss of water therein by evaporation, and to effect this object it is proposed to employ a supply reservoir, and from the upper part of this reservoir a pipe or passage is carried into the drum-case, and descending to or just below the water-line which it is desired to maintain. A funnel with a descending tube is provided for filling the water reservoir, and as water is poured into the reservoir it fills it nearly to the top, and then overflows down the pipe or passage before mentioned into the drum-case, and when this is full up to the level of the mouth of the spout or passage by which the gas enters, and which is at the desired water line, the surplus water runs down the spout, and escapes by an overflow plug-hole provided for the purpose.

1733.—CHARLES JOSEPH, of Grosvenor House, South Place, Kennington Park in the co. of Surrey, for "*Improvements in gas-burners.*" A communication Patent dated June 17, 1870.

The improvement consists in the manufacture of gas-burners for heating purposes, or those parts of them from which the gas is to be emitted, of a composition made by mixing the pulverized burnt fire-clay with powdered glass, carbonate of soda, or some other flux or substance of similar character, which may be baked with the fire-clay at a low red or white heat, and by its fusion at such heat will serve to unite the particles of fire-clay, but yet make with it a composition of a very porous character, which is sufficiently refractory to enable the gas to be burnt on its surface, and to bear the repeated heating and cooling to which a burner is subject. To make the composition for the burners the fire-clay requires to be first burnt as for fire-bricks, and to save trouble the best Stourbridge fire-bricks are generally taken for the purpose. The burnt fire-clay is then ground to about the fineness of coarse sand, and mixed with finely powdered glass or carbonate of soda in the proportion of one to one and a half parts by measure of glass to six parts of the fire-clay, or one part of carbonate of soda to eight parts of fire-clay. To this mixture a little gum water is added, as is necessary to make the mass sufficiently cohesive to enable it to be moulded into the required forms for the burners, which may be various; but in all cases must have a chamber within it for the expansion and heating of the gas before its emission. The burners or portion thereof made of the porous material after being moulded are balsed in a pottery or other kiln or suitable oven, in which they are heated so gradually that they will be about seven or eight hours arriving at a white heat, and are kept at that heat for about half an hour, after which they are allowed to lose. The flux or fusible matter when fused runs over the particles of fire-clay, and shrinks in such a manner as to leave innumerable fine pores between them for the issue of the gas, but yet causes the cohesion of said particles, and makes a porous material having considerable tenacity. The sockets of the burners, or other parts which are not required to be porous, are made of fire-clay, and the porous portions united to them by a cement composed of either of the fluxes or fusible materials above specified, mixed with finely pulverized fire-clay, but with a greater proportion of the flux or fusible material than is used in the porous composition. Equal quantities (by measure) of the pulverized fire-clay and glass are generally used for this purpose.

The cementing together of the parts may be effected by the first baking above mentioned, or by a subsequent similar baking.

The great advantage of burners constructed of this porous composition is their extreme durability, as though when in use the porous composition becomes heated to a red heat it is not thereby injured, and in experiments that have been made such burners have been used for two years continually without their having in any degree deteriorated.

1768.—Thomas Common Brown, of Ipswich, in the co. of Suffolk, engineer, for "*Improvements in valves applicable to steam or water pressure.*" Provisional protection only obtained. Dated June 21, 1870.

These improvements consist in making the exhaust port on the cylinder somewhat wider than usual, and casting across the centre a bar, to which is fixed a T-shaped piece. The slide-valve is formed by preference in one solid piece, so that the interior of the back shall rest on the top of the above-mentioned T-piece, while the face of the valve bears on the port face of the cylinder, as usual. An opening is made in the centre of the back of the valve in any desired proportion with the area of the surface pressing on the port face, and the margin of the opening fits steam-tight upon the face of the T-piece. The steam pressure will thus be removed from the centre of the valve in every part of its motion.

1799.—Andrew Stewart and James Stewart, of Glasgow and Coatbridge, both in the co. of Lanark, N.B., tube manufacturers, for "*Improvements in the manufacture of welded iron and steel tubes, and in apparatus therefor.*" Provisional protection only obtained. Dated June 24, 1870.

This invention consists in effecting in a single operation (instead of two or more as hitherto employed) the bending of the flat plate into the overlapped or butt-jointed tube or skelp ready for the ordinary welding process. In carrying out the invention the plate is drawn from the heating-furnace and first passed through a pair of plain horizontal rolls (that is, rolls with their axes horizontal), which guide and present it in a proper manner to the first pair of bending rolls. The first pair of bending rolls are horizontal, the lower one being concave and the upper one convex, and after passing them the partially bended plate is guided by a mandrel or internal guide which controls the bending over of the sides as the plate passes on to the second pair of bending rolls, which are vertical, and which bend the plate round into the overlapped or butt-jointed form required for the tube. The tube next passes through a pair of horizontal rolls shaped with suitable concave grooves, and finally, if necessary, through another similar pair of rolls.

1815.—David Rowan, of the city of Glasgow, in the co. of Lanark, N.B., engineer, for "*New or improved constructions and arrangements of valves and their actuating parts, and their application to steam boilers and engines, suitable also for other purposes.*" Provisional protection only obtained. Dated June 27, 1870.

This invention consists, first, in new or improved constructions and arrangements of the working parts of equilibrium valves, and the adaptation and application of these, with their self-acting float-valve arrangement, for regulating the feed water of steam-boilers; and, secondly, in adapting and applying the similar or like arrangement of valves, as self-regulating ball or other float valves, for discharging or trapping off the condensed steam and water, regularly and particularly, from the steam-jackets of cylinders and other parts of steam-engines, where it is formed or collected.

1849.—Samuel Norton, of the firm of Norton and Co., of Stockport, in the co. of Chester, patentees manufacturers, for "*An improved and combined hydraulic filter and double valve-tap.*" Patent dated June 29, 1870.

This invention consists of a tap or cock having two or more compartments, each fitted with a valve and ordinary screwed spindle and handle, and one of such compartments opening into an ordinary bib or pipe, and the other leading to a filter of peculiar construction, hereinafter described, through which the water or other liquid is drawn, and thereby filtered. This filter consists of a vessel by preference of a cylindrical form, constructed of sheet copper, or any other suitable cast or sheet metal, glass, or earthenware, inside which and between perforated diaphragms filtering material is placed, such filtering material consisting of layers of sponge, charcoal, sand, or other suitable filtering substance or compound, the thickness of such layers depending upon the pressure of the water or other liquid requiring to be filtered.

1872.—Thomas Gray, of New Wandsworth, in the co. of Surrey, chemist, for "*Improvements in the manufacture and purification of gas.*" Provisional protection only obtained. Dated July 1, 1870.

This invention is based upon the use of some chemical substance which has a strong affinity for naphthaline, and which will seize hold of this latter substance and hold it in solution or a liquid state, so that it may be drawn off with facility from the purifiers. It is found that most of the liquid hydrocarbons are capable of dissolving and absorbing the naphthaline, but, as an example, either spirit of turpentine or liquid paraffin is used. Any convenient quantity of the hydrocarbon spirit may be added to a solution of caustic soda or other alkali which has an affinity for carbonic acid, together with other chemical ingredients for taking up the sulphur and ether, as well known.

1949.—Peter Spence, of Newton Heath, Manchester, manufacturing chemist, for "*Improvements in the treatment of sewage, and in obtaining manures or fertilizing substances therefrom.*" Provisional protection only obtained. Dated July 9, 1870.

This invention consists in treating sewage with a certain compound, whereby it is deodorized, and substances are precipitated which are useful fertilizing agents. The compound employed consists of sulphate of alumina, alum, and persulphate of iron. The special method proposed for obtaining this compound is to employ calcined china-clay or analogous substance, advantage being taken of the mother liquor arising from the alum manufacture, which mother liquor contains alum in some cases, free sulphuric acid, and sulphate of iron. This gives rise to sulphate of alumina by combination of the acid with the clay, but leaving silica and some other matters.

1967.—Bristow Hunt, of 1, Serle Street, Lincoln's Inn, in the co. of Middlesex, gentleman, for "*Improvements in the process of and apparatus for carburetting gases or atmospheric air, so as to render the same applicable for lighting, heating, or producing motive power.*" A communication. Provisional protection only obtained." Dated July 12, 1870.

The improved apparatus employed in this invention is composed of a box of suitable metal, of any convenient form, serving as a reservoir for the liquid, several cylinders (also of metal) placed in pairs, and communicating with each other either below or above, the upper ends of the said cylinders being perforated with small holes, and covered by a dome-shaped cap. These cylinders or compartments have two bottoms, the upper one perforated and the lower one plain, and provided with a vertical tube; lastly, they are filled with pumice-stone broken into pieces about the size of a nut, or with any other spongy matter which is unalterable by contact with the liquid employed. The above-named compartments being placed in two rows, each row is connected by pipes to a small receiver. Two other cylinders or compartments, having a single bottom, and capable of being opened at the top, are filled with cotton wick not pressed closely; they communicate with each other, and one of them is in communication with one of the nearest of the compartments referred to, the other being provided with a tube and tap to allow the gas which it receives to escape.

APPLICATIONS FOR LETTERS PATENT.

1348.—Edmund Hunt, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in gullies or stench-traps.*" A communication. May 19, 1871.

1368.—William Walker, of Manchester, in the co. of Lancaster, for "*Improvements in the construction of steam-pumps.*" May 22. 1871.

1376.—Guillermo Reinlein, of Madrid, in the kingdom of Spain, officer in the Spanish army, for "*An improved pump.*" May 23, 1871.

1382.—Samuel Brothers Darwin, of Shrewsbury, in the co. of Shropshire, for "*Improvements in apparatus used in the manufacture of gas.*" May 23, 1871.

1395.—Thomas Fletcher Chappé, of Bolton, in the co. of Lancaster, cotton spinner, and member of the Society of Civil Engineers, for "*Improvements in valves for regulating the flow of steam, fluids, and gases.*" May 24, 1871.

1407.—Richard Clarke, of Manchester, in the co. of Lancaster, engineer, for "*Improvements in fans for blowing, propelling, or exhausting air or other fluids.*" May 25, 1871.

1411.—Alfred Tylor, of 2, Newgate Street, in the City of London, brassfounder, for "*Improvements in meters for measuring liquids.*" May 26, 1871.

1417.—Alfred Atkinson Pollock and Julius Frederick Moore Pollock, both of Leeds, in the co. of York, for "*Improvements in dry closets, commodes, and urinals.*" May 26, 1871.

1445.—Thomas Harrison Granger and Jean Paul Louis Hyan, of Berlin, in the kingdom of Prussia, manufacturers, for "*Improvements in the mode of carrying away the refuse from sewers in towns and manufactories, and separation of the gases from the solids, and making of manure therefrom.*" May 31, 1871.

1453.—Thomas Sweeney, of Boston, in the co. of Suffolk and State of Massachusetts, U.S.A., for "*An improved machine for measuring and registering a flowing liquid, termed a fluid meter.*" (Complete specification.) May 31, 1871.

1461.—William Clay, of Birkenhead, in the co. of Chester, iron manufacturer, for "*Improvements in the construction of gas-furnaces.*" June 1, 1871.

GRANTS OF PROVISIONAL PROTECTION.

229.—Josiah George Jennings, of Palace Road, in the parish of Lambeth, sanitary engineer, for "*Improvements in the means of supplying water, with the view of preventing waste.*" Jan. 28, 1871.

461.—Benjamin Slater, of Wellington Foundry, Charles Street, City Road, in the co. of Middlesex, ironfounder, for "*Improvements in apparatus for regulating the turning of gas, water, or other cocks, the opening and closing of ventilators, skylights, and other like objects.*" Feb. 22, 1871.

531.—Algernon Guthrie and James Stevenson, of Gravesend, in the co. of Kent, for "*Improvements in motive-power engines, pumps, and meters.*" Feb. 27, 1871.

1207.—William Robert Lake, of the firm of Haseltine, Lake, and Co., Southampton Buildings, London, patent agents, for "*Improvements in the construction of draught-tubes or globes designed to be used as a substitute for the globes ordinarily placed on gas-burners.*" A communication. May 4, 1871.

1227.—Alfred Vincent Newton, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in liquid-meters.*" A communication. May 6, 1871.

1247.—George Warsop, of 76, Royal Terrace, Queen's Walk, Nottingham for "*Improvements in pipe-wrenches.*" May 9, 1871.

1266.—Daniel Nickols, of the city of Manchester, in the co. of Lancaster, engineer, for "*Improvements in taps, cocks, or valves.*" May 11, 1871.

1293.—John Grindrod, of Manchester, in the co. of Lancaster, engineer, for "*An improved automatic boiler-feeding apparatus, applicable also as a fluid-meter.*" May 13, 1871.

1348.—Edmund Hunt, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in gullies or stench-traps.*" A communication. May 19, 1871.

1368.—William Walker, of Manchester, in the co. of Lancaster, for "*Improvements in the construction of steam-pumps.*" May 22, 1871.

1376.—Guillermo Reinlein, of Madrid, in the kingdom of Spain, officer in the Spanish army, for "*An improved pump.*" May 23, 1871.

1382.—Samuel Brothers Darwin, of Shrewsbury, in the co. of Shropshire, for "*Improvements in apparatus used in the manufacture of gas.*" May 23, 1871.

NOTICES TO PROCEED.

54.—Thomas Hydes, Joseph Bennett, and John Emil Bennett, all of Sheffield, in the co. of York, for "*Improved apparatus for cooling liquids and condensing vapours.*" Jan. 10, 1871.

113.—John Fleming Allan, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in making illuminating gas, and in apparatus therefor.*" Jan. 16, 1871.

151.—James Hosken, of 58, Fenchurch Street, in the City of London, engineer, for "*Improvements in automatic apparatus for controlling the flow of liquids from constant supply-pipes or vessels.*" Jan. 20, 1871.

201.—Robert Porter and Thomas Lane, both of 172, Fenchurch Street, in the City of London, engineers, for "*Improvements in the manufacture of gas for illumination, and in the apparatus connected therewith.*" Jan. 25, 1871.

619.—William George Cannon, of 52, New Kent Road, in the co. of Surrey, for "*An improvement in gas, steam, or water cocks.*" March 8, 1871.

1008.—Francis George Fleury, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, for "*Improvements in meters or apparatus for measuring flowing liquids.*" April 15, 1871.

1033.—Benjamin Harlow, of Macclesfield, in the co. of Chester, engineer, for "*Improvements in the manufacture of cast-iron pipes and in apparatus therefor.*" April 19, 1871.

1036.—David Spence, of Manchester, in the co. of Lancaster, manufacturing chemist, for "*Improvements in the treatment of spent oxide of iron arising from the purification of gas, or the said oxide when partly spent.*" April 19, 1871.

1207.—William Robert Lake, of the firm of Haseltine, Lake, and Co., Southampton Buildings, London, patent agents, for "*Improvements in the construction of draught-tubes or globes designed to be used as a substitute for the globes ordinarily placed on gas-burners.*" A communication. May 4, 1871.

1227.—Alfred Vincent Newton, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in liquid-meters.*" A communication. May 6, 1871.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1598.—Alfred Vincent Newton, "*Improvements in liquid-meters.*" May 15, 1868.

1642.—John Kennett, "*An improved method of ventilating sewers.*" May 20, 1868.

1645.—Claude Ludovic Taverdon and Jules Moret, "*An improved lift and force double-action pump, giving a continuous and regular supply of liquid.*" May 20, 1868.

1655.—William Tijou, "*Improvements in steam-pumps.*" May 20, 1868.

1668.—Edme Augustin Chameroy, "*An improved liquid or gas meter.*" May 21, 1868.

1675.—Thomas Goode Messenger, "*Improvements in fire-engines or double-action pumps.*" May 21, 1868.

1699.—Edwin William De Rusett, "*Improvements in engines worked by steam or other motive fluid, specially applicable to steam-pumps.*" May 23, 1868.

1738.—William Barry Lord, "*Improvements in portable filters.*" May 26, 1868.

1751.—John Scholl, "*Improvements in gas-burners, and in apparatus to be used in connexion therewith.*" May 27, 1868.

PATENT WHICH HAS BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

1293.—James Adams, "*Improvements in cocks and apparatus for drawing off and regulating the flow of fluids.*" May 24, 1864.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
18	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.			Glasgow.			Newcastle and Middlesboro'.			Wales.			Yorkshire, Derbyshire, and Staffordshire.		
	£.	s.	d.	£.	s.	d.	£	s.	d.	£.	s.	d.	£.	s.	d.
Pig Iron, No. 1 (g.m.b.)	3	15	0	2	17	6	2	11	0	3	10	0	3	15	0
1¼ and 2-inch Socket-pipes	7	0	0	5	15	0	5	10	0	6	0	0	7	0	0
2½ and 3-inch ditto	6	10	0	5	5	0	5	0	0	5	15	0	6	10	0
4 and 5-inch ditto	6	0	0	4	15	0	4	10	0	5	5	0	6	0	0
6 inches and upwards ditto	5	15	0	4	5	0	4	0	0	5	0	0	5	15	0
Retorts, 1st fusion, hot blast	5	10	0	4	10	0	4	5	0	5	0	0	5	10	0
Ditto, 2nd ditto, cold ditto	6	10	0	—			—			—			6	10	0
Teak-plates, ¾ thick and above	6	0	0	5	0	0	4	15	0	5	10	0	6	0	0

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1 8	1 1	0 10	0 7	0 5	0 4½
Ditto ditto, from 12 in. to 23½ in.—each	3 0	2 0	1 6	1 1	0 9	0 8
Long Screws, from 12 in. upwards	4 0	2 3	2 0	1 6	1 2	0 11
Bends and Springs	4 3	2 3	1 9	1 3	0 11	0 8
Square Elbows, equal or reducing; Round Elbows, 6 per cent. extra	3 9	2 3	1 9	1 3	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 9
Crosses, ditto, equal or reducing	4 9	3 6	2 0	2 3	1 9	1 6
Iron Cocks	20 0	13 0	10 0	7 0	5 0	3 6
Ditto, with brass plug	28 0	18 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4½
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 3-quart	15 0	14 0	13 6	13 0	12 0	—

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign:—*	Per Keel.
Chatham and Rochester	5s. 3d. to 5s. 6d	Barcelona	£21 0s
Cork	8 0	Bordeaux	9 0
Dover, Folkestone, and Ramsgate	5 9	Boulogne and Calais	7 0
Dublin	9 6	Cadiz	11 15
Exeter Quay	7 6	Cronstadt	8 10
Ipswich	5s. 6d. to 6 0	Copenhagen	7 0
London (from Leith)	—	Genoa	17 10
London (Pool)	5 9	Hamburg	8 5
Lowestoft and Yarmouth	5 0	Havre de Grace	7 15
Portsmouth & Southampton	7 0	Leghorn	17 10
Plymouth	7 6	Lisbon	10 10
Shoreham	7 0	Rotterdam	7 0
Whitstable	6 0	Stettin	9 0
Weymouth	7 3	Trieste	15 0
		Venice	20 0

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £3 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	3 15 0
Ingham's ditto (at Wortley), per 1000	3 15 0
Stanley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, per foot run	5s. 6d. to 0 7 6
Tarred Rope Yarn, per cwt.	1 0 0

GAS COALS.

Newcastle—Unscreened:—	Per Ton.
	6s. 6d.
Haswells, Nettlesworth Primrose, and South Pelaw	
Pelton, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 6
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	17 6
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel, f.o.b.:—	Per Ton.	*Scotch Cannel, f.o.b.:—*	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith	48s. 2d	Arniston (at Leith)	21s. 0d
Muirkirk	27 0	Wemyss (at Wemyss)	20 0
Kirkness, best (at Burntisland)	32 6	Haywood Co.'s Haywood (at Granton)	21 0
Capeldrae, 1st quality (at ditto)	32 6	Pirnie, or Methill	17 0
Ditto, 2nd ditto (at ditto)	17 6	Lothian's 'annel (at Leith)	24 6
Cowdenbeath (at ditto)	13 0	Grange ditto (at Bridgeness)	17 0
Lochgelly (at ditto)	12 0	Kinniel ditto (at Bo'ness)	17 6
Donnibristle—at Burntisland, 12s.; at Aberdour	12 6	Myles' ditto	23 6
Auchinheath Lesmahago (at Granton)	27 0	Lochore Parrot (at Burntisland)	25 0
Duke of Hamilton's Lesmahago (at Granton)	27 0	Do. (at Waverley Seam)	16 0
		Lanemark (at Glasgow)	16 0
		Elphinstone Tower (at Leith)	20 0

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	22 — 23
5000	20	Bahia (Limited)	20 0 0	3 0 0	13½ — 14
1000	20	Do., preference	20 0 0	10 0 0	24 — 26
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	6 10 0	6¾ — 7
16000	5	Do., third issue	4 0 0	6 10 0	5 — 6
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbdge., & Holywll.)	20 0 0	10 0 0	32 — 33
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19½ — 20½
112000	10	*Chartered*	10 0 0	8 0 0	15½ — 15⅝
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6¾ — 7¼
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	12¾ — 13¼
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	2¾—2¾pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
17490	25	*Commercial*	25 0 0	10 0 0	42½ — 43½
20000	20	Continental Union	20 0 0	8 0 0	24½ — 25½
10000	20	Do., new	7 10 0	8 0 0	2—2¼ pm.
5213	20	Do., preference (France: Strasbg., Cette, Nismes, Montargis, Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 26
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16¼ — 16⅞
5000	10	Do., preference	10 0 0	6 0 0	11 — 12
6044	10	Do., new shares	10 0 0	7 0 0	12 — 13
3956	10	Do.	1 0 0	7 0 0	1¼ — 1½
4000	50	*Equitable*	50 0 0	10 0 0	93 — 95
4000	25	Do., new shares	25 0 0	10 0 0	46½ — 47½
23406	10	European (Limited)	10 0 0	11 0 0	16 — 16⅞
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	3 — 3⅛
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	12 — 13
26000	50	*Imperial*	50 0 0	10 0 0	87 — 89
26000	10	Do., new shares	10 0 0	10 0 0	17½ — 17⅞
26000	12½	Do., new shares	12 10 0	7 0 0	10 — 10⅛
25000	12½	Do., new shares, 1870	5 0 0	7 0 0	2½ — 3 pm.
1300	100	Do., bonds	£100	10 0 0	190 —195
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	67 — 69
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	68 — 70
3000	10	Do.	10 0 0	5 0 0	7½ — 8¼
3000	20	Do.	17 0 0	7 10 0	3½ — 4¼ pm.
7133	8k.	*London*	100 0 0	10 0 0	174 —176
5610	8k.	Do., 1st preference	100 0 0	6 0 0	112 —116
505	8k.	Do., 2nd preference	100 0 0	6 0 0	
214	8k.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
		Niethercy, Brazil (Limited)			
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	4 — 4¼
6000	5	Do., preference	5 0 0	7 0 0	4¾ — 5¼
20000	5	Mauritius (Limited)	5 0 0	6 0 0	2¾ — 2¾
30000	5	Oriental (Calcutta)	5 0 0	10 0 0	7¾ — 8¼
30000	5	Do., new shares	2 10 0	10 0 0	1¾ — 2 pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2¾ — 2⅞
14000	10	Pará (Limited)	10 0 0	8 0 0	11 — 12
27000	20	*Phœnix*	20 0 0	10 0 0	35½ — 36½
3600	100	Do., new	40 0 0	7 10 0	43 — 45
144000	8k.	Do.	100 0 0	5 0 0	86 — 89
5000	20	*Ratcliff*	20 0 0	10 0 0	33 — 35
	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	31½ — 32½
6959	5	Singapore (Limited)	5 0 0	6 0 0	
2000	5	Do., preference	5 0 0	7 10 0	
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	87 — 89
4000	12½	Do.	12 10 0	10 0 0	21 — 22
20000	12½	Do., new shares	2 10 0	10 0 0	5—6 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16¾ — 17½
10000	10	Do., new	6 0 0	10 0 0	4¾ —5¼pm.
9000	4	United General (Limerick)	4 0 0	5 0 0	3 — 3½
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	12 — 13
1500	10	Do.	10 0 0	7 10 0	
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	17½ — 18½
10000	10	Do., B shares	9 0 0	10 0 0	7 —7¼ pm.
10000	10	Do., C shares	9 0 0	10 0 0	7 —7¼ pm.
20000	10	Do., D shares	1 0 0	10 0 0	2¾ — 3 pm.
16000	5	*West Ham*	5 0 0	8 0 0	6¼— 6⅝
10000	5	Do., new shares	1 0 0	8 0 0	1¼— 1⅜
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

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WANTED, two second-hand Purifiers, about 8 ft. by 4 ft.

Send price and particulars to STEVENS AND SONS, Darlington Works, Southwark Bridge Road, LONDON.

WANTED, a Governor for a 400,000 ft. Gasholder, with 18-in. inlet and outlet, with bye-pass and pressure-gauges, fitted and fixed complete at the Gas-Works, Wakefield.

Parties tendering to send a sketch of their Governor along with price, on or before the 17th of June inst., endorsed "Tender for Governor."

JOHN WHITAKER, Secretary.

Gas-Office, Wakefield, June 2, 1871.

FOR SALE, one Cockey's Patent 10-in. Centre-Valve for four purifiers; One Carter's Patent 10-in. Valve; Six ordinary 10-in Flange-Valves; Six Purifier-Lids, 8 ft. by 8 ft.; and Two Jib Cranes; the whole of which have been in use only a short time, and are nearly equal to new.

Apply to J. HEPWORTH, Gas-Works, CARLISLE.

FOR SALE, Mouthpieces, Hydraulic Main, Ascension and Dip Pipes for five beds of Retorts of seven in a bed.

Apply to Tynemouth Gas Company, NORTH SHIELDS.

FOR SALE, the entire Plant of a small Gas-Work, capable of making 30,000 feet per diem.

Apply to Mr. MEACOCK, Norwood Green, MIDDLESEX; or 15 and 16, GILTSPUR STREET, E.C.

FOR SALE, a Station-Meter to pass 6000 cubic feet of gas per hour, fitted with time-piece and tell-tale. It has just been fitted with a new drum, and is in every respect as good as a new meter. It may be seen in London.

Also for Sale, a 6-in. second-hand GOVERNOR, in very good condition, and some second-hand PURIFIERS, suited for small works, of various sizes.

For price and particulars, apply to EDWARD COCKEY AND SONS, FROME.

GASHOLDERS FOR SALE.

TO BE SOLD, by Private Bargain, two good GASHOLDERS. To be seen at the works of the Blairgowrie Gaslight Company. Size of each 22 ft. diameter by 12 ft. Contents 5000 cubic feet. The foreman at the works will show the Holders.

Offers to be lodged with Messrs. ANDERSON AND CHAPMAN, Solicitors, Blairgowrie, on or before the 15th of June next.

Blairgowrie, May 30, 1871.

THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 30th inst.—Philip Twells, Esq., the Chairman—when the following Resolutions were passed:—

Resolved unanimously—"That the report upon the affairs of the Association now read be received, adopted, and entered on the minutes."

Resolved unanimously—"That a dividend of £2 per share be declared upon the 56,000 shares of the Association, for the half year ended the 31st of December last; and that the said dividend be payable, free of income-tax, on and after the 15th of June next."

Resolved unanimously—"That John Carrington Palmer, Esq., be re-elected a Director of the Association."

"That Sir Francis Henry Goldsmid, Bart., M.P., be re-elected a Director of the Association."

"That Thomas Henry Goodwin Newton, Esq., be re-elected a Director of the Association."

"That Joseph Sebag, Esq., be re-elected an Auditor of the Association."

"That the best thanks of the meeting be given to the General Superintendent of the Association on the Continent, Mr. G. W. Drory, and to the Engineers at the several stations, for the zeal and ability with which they have so unremittingly discharged their respective duties."

"That the cordial thanks of the meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair this day."

By order of the Board of Direction,

ALBERT F. JACKSON, Secretary.

30, Clement's Lane, Lombard Street, London, May 31, 1871.

TO BE SOLD, a 6-in. Governor complete, by West and Gregson, of Oldham. Second hand; price £10.

May be seen, and particulars obtained from the MANAGER, at the Gas-Works, LEEK; or from C. HENSHAW, Clerk to the Leek Improvement Commissioners.

THE Bromsgrove Gas Consumers Company, Limited, have for SALE a STATION-METER complete, with bye-pass attached thereto, in good condition; will pass 30,000 feet per 24 hours. Will be at liberty in June next.

Apply to HENRY BREWSTER, Secretary of the Gas Consumers Company, BROMSGROVE.

TO BE SOLD.

THE Wallasey Local Board invite OFFERS for the purchase of the following Old Apparatus now being taken down at their Gas-Works, Great Float, near Birkenhead, to make way for larger Apparatus, viz.:—

A set of Purifiers, 6 ft. square, with hydraulic change-valve complete.

A set of 6-in. Condensers.

Six lengths of D-shaped 16-in. Hydraulic Main, with 4-in. bridge-pipes, &c.

A Station-Meter, capacity 5000 cubic feet per hour.

The Apparatus, which will be taken down by the board, and sold at the works, is in fair condition, and may be seen at any time.

All inquiries and offers to be addressed to the Engineer (Mr. E. H. HARRIS), Gas-Works, Great Float, near Birkenhead.—By order,

T. SOMERVILLE JONES, Clerk to the Board.

Public Offices, Egremont, Birkenhead, May 8, 1871.

TAR.

THE Manager of the St. John's, Porto Rico, Gas-Works will receive offers for his produce of TAR. From 18,000 to 20,000 gallons per year.

Apply to J. G. STEINACHER, at St. John's, Porto Rico, WEST INDIES.

THE Directors of the Watford Gas and Coke Company are desirous of receiving TENDERS for a set of Four New PURIFIERS, according to plans and a specification which may be seen at the Company's Works, Watford, Herts.

Sealed tenders, endorsed "Tender for Purifiers," to be sent to the Company's Office, No. 5, Derby Road, Watford, on or before the 12th of June, 1871.

The directors do not pledge themselves to accept the lowest or any other tender.

By order of the Board,

WILLIAM ROWELL, Secretary.

PRIVATE TELEGRAPHS FOR GAS AND WATER WORKS.

THE Electric Telegraph Department of our business is most efficiently conducted by an experienced staff. CONTRACTS entered into for maintenance and erection of lines for Gas and Water Companies, private residences, hotels, steamships, &c. Bailey's simple A B C instrument is stronger and less liable to derangement than any other in the market.

Sole makers of L. J. Crossley's Electrical Speed Indicator.

Sole makers of Chatwood's Patent Electrical Ship's Log.

Sole makers of Bailey's dust-proof and damp-proof Signal-Bell.

Managers of Gas and Water Works are invited to ask us for our quotations, or for any information connected with Telegraphy.

JOHN BAILEY AND CO., Turret Clock Makers to the late Earl of Rosse, the British and Foreign Governments, &c., Electric Telegraph Engineers, and General Brassfounders, Albion Works, Salford, MANCHESTER.

THE KIDDERMINSTER GASLIGHT AND COKE COMPANY

CONTRACT FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of the best quality of GAS COAL, delivered free at Railway Station.

Sealed tenders to be addressed to the MANAGER not later than the 6th of July.

Gas-Works, May 17, 1871.

TO COAL OWNERS.

THE Gas-Works Management Committee, Middlesborough, are prepared to receive TENDERS for GAS COAL, to be delivered on to their siding at Middlesborough as under:—

1871, August	600	tons.
,, September	800	,,
,, October	1000	,,
,, November	1150	,,
,, December	1300	,,
1872, January	1250	,,
,, February	1100	,,
,, March	1000	,,
,, April	800	,,
,, May	650	,,
,, June	600	,,
,, July	550	,,
Total	10,800	tons.

The quantity per month to be regular daily or weekly supply, as required by the Manager.

Contractors may tender for all or portions of the above quantities, but the tender must state the name of pit, price per ton of 20 cwt., and whether screened, unscreened, or nut Coals, and must be delivered to the undersigned not later than July 1, 1871.

The Committee do not bind themselves to accept the lowest or any tender.

By order,

A. C. FRASER, Engineer and Manager.

STATION-METERS.

MESSRS. J. and J. BRADDOCK beg to inform Gas Companies and Engineers that they are prepared to SUPPLY STATION-METERS and GOVERNORS at the shortest notice. They have now the following Meters either completed or in course of construction:—60,000, 40,000, 15,000, 10,000, 8000, 6000, 5000, 4000, and 3000 feet per hour; also 20,000 feet per hour second hand.

Globe Meter-Works, Oldham, May 20, 1871.

EDGE'S PATENT

FOR REMOVING THE

CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

Testimonial of Mr. W. Ford, Engineer of the Stockton Corporation Gas-Works.

"Dear Sir,—In reply to your inquiry as to my experience of Edge's patent method for removing the Carbonaceous Incrustation from through Retorts, I have much pleasure in expressing my thorough appreciation of the process; it has been the means of saving our stokers many hours hard work, and the Retorts much serious destruction.—I am, dear sir, yours truly,

"W. FORD.

"To E. Goddard, Esq., Ipswich."

For particulars and terms, apply to E. GODDARD, Sole Agent, Gas-Works, IPSWICH.

Now ready, demy 8vo, half bound roan, cloth sides, lettered, price 7s. 6d., by post 8s.,

THE GAS MANAGER'S HANDBOOK,

CONSISTING OF

TABLES, RULES, AND USEFUL INFORMATION

For GAS ENGINEERS, MANAGERS,

AND OTHERS ENGAGED IN THE

MANUFACTURE AND DISTRIBUTION OF COAL GAS.

By THOMAS NEWBIGGING A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

A CHECK SYSTEM OF BOOK-KEEPING FOR GAS COMPANIES.

"Mr. Charles Hight, Public Accountant, of 26, Budge Row, has brought out a work most useful to gas companies, the practical application of which will render frauds impossible. . . . It is based on a principle ensuring the best possible check on the rental and the sales, with a greatly improved method of recording the expenditure. The plan is adapted to the Board of Trade regulations for the form and details of the half-yearly published accounts of the London companies."—*Globe.*

"An admirable plan. . . . Has the merit of simplicity."—*City Press.*

For instructions and forms, apply to NISSEN, PARKER, AND ARNOLD, 43, Mark Lane, LONDON, E.C.

TO GAS COMPANIES, ENGINEERS, BUILDERS, &c.

THE PATENT ANTI-GALVANIC PAINT

Is guaranteed to prevent and arrest Rust on all Ironwork, and to cover Tar most effectually. It is most valuable for protecting it from the action of salt water, rain, sulphurous and gaseous exhalations. It has been well tested at various Gas-Works, in covering Tar on Gasholders, Purifiers, &c., and has given great satisfaction.

Testimonials given if required, and sample cans for trial sent free of charge.

All communications to be addressed to

Messrs. STEVENS & CO., 156, CHEAPSIDE, LONDON.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Extract from Dr. Frankland's Course of Lectures at the Royal School of Mines, February, 1868.

"Scholl's Platinum Perfecter is one of the most important inventions of modern times in connexion with the burning of coal gas."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers.

JOHN SCHOLL, Manufactory: 41 & 42, BERWICK STREET;

Retail Depot: 198a, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

. Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gas-Fittings and Gas Apparatus.

MODERN STREET LIGHTING, by WILLIAM SUGG, A.I.C.E., price 1s. 6d., is now ready, and will be forwarded post free for 19 stamps.
W. SUGG, Vincent Works, Vincent St., WESTMINSTER, S.W.

RUTTER ON GAS LIGHTING.

SOON will be published—a new Edition, thoroughly revised, being the 198th thousand, of the ADVANTAGES OF GAS, by J. O. N. RUTTER, Black Rock, BRIGHTON.
June 3, 1871.

MANCHESTER CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for the purchase of the whole or portions of the GAS TAR to be produced at these works, for the term of One or more years, as may be agreed upon, commencing on the 1st day of March next. The total quantity that will be produced during the first year is estimated at 2,750,000 gallons or thereabouts.

Sealed tenders, addressed to the Chairman of the Gas Committee, Albert Chambers, Albert Square, and endorsed "Tender for Gas Tar," must be delivered at this Office on or before the 15th day of June next.

The Committee do not bind themselves to accept the highest or any tender.

Further particulars as to conditions of contract and forms of tender may be obtained on application to Mr. Peacock, at the Gas Office.

By order of the Gas Committee,
JOSEPH HERON, Town-Clerk
Gas Office, Albert Chambers, Albert Square, April 28, 1871.

TO BE SOLD, at the Rhyl Gas-Works, North Wales, 23 15-in. Mouthpieces for Clay Retorts, ascension-pipes, hydraulic main, and delivery pipes complete. One set of 8-in. double vertical Condensers. One Station-Meter (Bent and Co.), with valves and connexions complete, to pass 4000 feet per hour. Four sets of Purifiers, respectively 6 ft. by 3 ft. 6 in., 4 ft. by 5 ft., 4 ft. by 4 ft., with connexions, &c., complete. Large lot of cast and wrought iron, comprising the interior Fittings of a 10,000 feet Gasholder; and sundry other materials.

Applications to MILES R. FARRINGTON, Secretary, Gas Company, Limited, RHYL.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

ROBERT MACLAREN and CO., EGLINTON FOUNDRY, GLASGOW, Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

J. T. B. PORTER & CO.,

GAS ENGINEERS,

MANUFACTURERS AND CONTRACTORS FOR GAS-WORKS

Of any extent at Home and Abroad,

GOWTS BRIDGE WORKS, LINCOLN,

AND

5, QUEEN SQUARE, WESTMINSTER, S.W.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

"METER LIFE BOOK,"

By R. P. KEYS, Accountant, 26, BUDGE ROW, LONDON, E.C.

3rd Edition. Specimen Sheets, illustrated, 5s.; plain, 3s. 6d.

Has been adopted in England, Scotland, Ireland, and India. Simplest plan that has been projected.

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JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON AGENT:

MARCUS BOURNE NEWTON,

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

ALFRED LASS,
ACCOUNTANT,
28, NORTH STREET, WANDSWORTH, S.W.

Mr. Alfred Lass having had considerable experience in arranging, making up, balancing and auditing gas accounts, begs to inform the Directors of Gas Companies that he may be consulted on all matters relating thereto.
Balance-sheets prepared, Accounts audited, Consultations, Agencies, &c.

BOOKS FOR GAS ACCOUNTS.

ALFRED DOUBBLE & Co., 2, Serjeants Inn, and 40, Fleet Street, London, make and supply all the various ACCOUNT-BOOKS as approved and adopted by Accountants, &c., to Gas Companies.
A complete set of the Books and Forms forwarded within a few days from receipt of order.

EDWARD SANDELL, Public Accountant and Auditor, 4, Skinner's Place, Size Lane, London.
The projector of the *Original Gas Companies Analyzed Expenditure Account-Book* offers his experience and services in the examination, preparation, and production of all accounts in reference to Gas Companies. References if required.

MR. ARTHUR SILVERTHORNE, formerly Assistant Engineer to the late Mr. Samuel Hughes, C.E., F.G.S., ADVISES Corporations, Companies, and others, in all matters relating to the Supply of Gas and Water.
Offices: 3, Craven Street, Charing Cross, London, W.C.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.
Offices: 22, Coleman Street, London, E.C.

ALFRED PENNY, Gas and Consulting ENGINEER,
Wenlock Iron-Works,
21, WHARF ROAD, CITY ROAD, LONDON.
Mr. Penny having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, and T-pieces, &c., &c.
Plans, Specifications, and Estimates prepared.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, Westminster. [Office of the Journal of Gas Lighting, &c.]

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.
Henry Greene and Son, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, E.C., and 135, Regent Street, London.
Agents wanted.

OXIDE OF IRON.—
We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

JAMES OAKES & CO.,
FLEETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. Charles Horsley, Agent.

BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. Sugg & Co., Ghent, will receive immediate attention.

D. GRANT & CO.,
WET & DRY GAS-METER MANUFACTURERS.
STATION-METERS ANY SIZE,
PHOTOMETERS, EXPERIMENTAL METERS, &c.
GAS-METER WORKS, CROSSCAUSEWAY,
EDINBURGH.

BRITISH ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING OF MEMBERS.

CIRCULAR OF ARRANGEMENTS.

THE

EIGHTH ANNUAL GENERAL MEETING

OF THE MEMBERS OF THIS ASSOCIATION WILL BE HELD ON

TUESDAY, WEDNESDAY, & THURSDAY, the 13th, 14th, & 15th of JUNE, 1871,

AT THE

ROYAL DUBLIN SOCIETY'S ROOMS, KILDARE STREET, DUBLIN.

EDWARD WHITE, ESQ., VICE-PRESIDENT,
Will occupy the Chair.

ORDER OF PROCEEDINGS.

TUESDAY, JUNE 13, 1871.—Morning Meeting.

The Chair to be taken at Eleven o'clock.

Inaugural Address by the Vice-President. | Admission of New Members.
Reading of Papers and Communications.

Evening Meeting.

The Chair to be taken at Seven p.m.

Lecture by Dr. Letheby on "The Analysis of Gas."

WEDNESDAY, JUNE 14, 1871.

The Chair to be taken at Eleven a.m.

Reading of Papers and Communications. Election of Officers for ensuing Year, &c.
At Six p.m. the Members and Friends will dine together at the Ancient Concert Rooms, Dublin.
Tickets for the Dinner, 7s. 6d. each, may be had from the Secretary.

THURSDAY, JUNE 15, 1871.

An excursion, the particulars of which will be announced in the programme.

LIST OF PAPERS AND COMMUNICATIONS

TO BE SUBMITTED TO THE MEETING.

REPORT OF THE COMMITTEE ON THE ESTABLISHMENT OF A BENEVOLENT-FUND AND THE REDUCTION OF SUNDAY LABOUR.

"Lithology of Gas Coals." By Mr. Jas. Paterson, Warrington.
"On the best Form of Condenser." By Mr. W. J. Warner, South Shields.
"On a New Equilibrium Gas-Governor." By Mr. Chas. Hunt, London.
"On the Economy of employing Exhausters." By Mr. Geo. Anderson, London.
"On the Apparatus for and Method of Manufacturing Sulphate of Ammonia suitable for Small Works." By Mr. Jas. Eldridge, Richmond.
"On the Cause and Prevention of Choked Ascension-Pipes." By John Somerville.
"Carbonizing Accounts." By Mr. W. J. Warner, South Shields.
"Carbonizing Accounts." By Mr. John Niven, Clayton.
"Coal Storeage and Spontaneous Combustion of Coals." By Mr. A. H. Wood, Hastings.
"Spontaneous Combustion in Coal-Stores." By Mr. A. C. Fraser, Middlesborough.
"On Gas Measurement." By Mr. F. W. Hartley, London.
"On the Manufacture of Gas from Coal Tar." By Mr. J. Arnott, Leeds.
"Additional Experience of Tar Pavement." By Mr. Geo. Anderson, London.

May 22, 1871. WILLIAM H. BENNETT, *Hon. Sec.*

WILLEY & FORD,

GAS ENGINEERS, EXETER,

Having completed their NEW WORKS in the COMMERCIAL ROAD, for the supply of every description of GAS APPARATUS, respectfully invite the attention of GAS COMPANIES and others to their various Manufactures, especially appertaining to GAS-WORKS.

ENGINEERING DEPARTMENT.

They have lately had the pleasure of ERECTING NEW GAS-WORKS and LIGHTING the following towns:—

Chagford, Holsworthy, and Northtawton, Devon; Chard and Chardstock, Somerset Trecastle, Breckonshire; and Finchcox, Kent.

They have also executed many improvements and extensions at the following Gas Companies Stations:—BIDEFORD, DAWLISH, DEVONPORT, DARTMOUTH, EXMOUTH, ILFRACOMBE, LISKEARD, ST. AUSTELL, WELLINGTON, DUBLIN, BRECON, CARDIGAN, PONTYPOOL, TOTNES, TRURO, &c., to either of which they refer with much confidence, and the most satisfactory testimony will be given of the manner in which the various works have been executed.
TOWNS or VILLAGES not yet supplied can be lighted with gas at a moderate cost.
PLANS and ESTIMATES furnished and Gas Companies advised on improvements, extensions, and alterations of works.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their DRY METERS, over 2000 being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

☞ *Please note the Address*—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

IMPROVED CONSUMERS GAS-METERS,

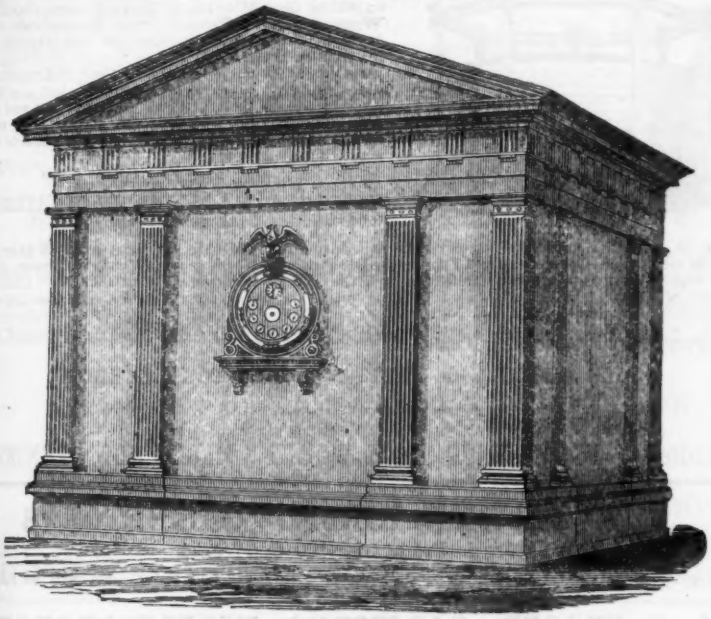
Of the best material and workmanship, carefully adjusted to the requirements of the British Sales of Gas Act and Foreign Standards of Measures.

PATENT FIXED WATER-LINE GAS-METERS,

Which are uniform with the ordinary Meters, and register with minute accuracy.

IMPROVED DRY GAS-METERS,

IN BEST TINNED IRON CASES.



GAS STATION-METERS,

WITH PLANED JOINTS.

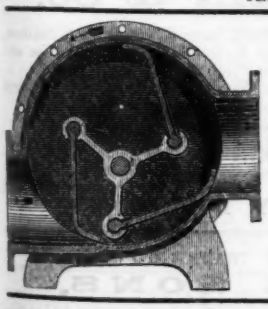
GOVERNORS, GAUGES, INDICATORS, EXHAUST-GOVERNORS, &c.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.



CHARLES HORSLEY'S

PATENT

GAS EXHAUSTER.

(From 250 Feet upwards per Hour.)

Also,

ROTARY TAR AND OIL PUMPS.

For particulars and prices apply to the Patentee,

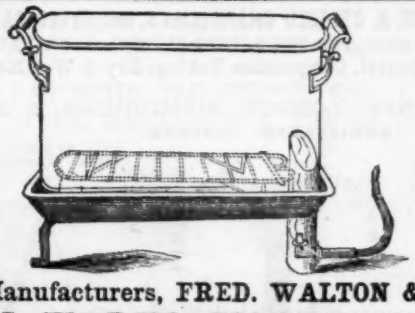
22, Wharf Road, City Road, London. N.

SOUTHBY'S

PATENT.

THE ECONOMIC GAS ROASTER,

WITH PERFECT VENTILATION.



Sole Manufacturers, FRED. WALTON & CO.,

OLD HALL WORKS, WOLVERHAMPTON,

AND

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This wonderful adaptation of science to cooking is found to roast any joint of meat, poultry, or game better as well as cheaper than any kitchen range; is beautifully clean, gives no trouble, and may be used in any room where gas is laid on. The Economic Gas Roaster is absolutely free from any smell.

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Invites attention to his

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And respectfully states that he has erected improved Steam Machinery for their manufacture, and devotes great care to supply Grids which will give satisfaction.

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which indicates pressure or vacuum in ONE TUBE. Having but one joint, the Gauge can be taken asunder, cleansed, and refixed in a few minutes.

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Lochore seam	11,351	37·06	0·33	1414	52	12
or.....	12,000	34				
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Yield of gas per ton	10,296 cubic feet.
Illuminating power rather over	21 sperm candles.
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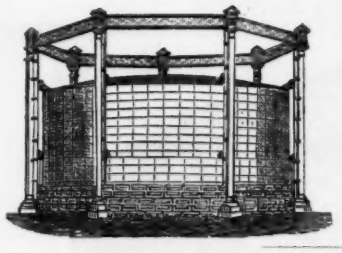

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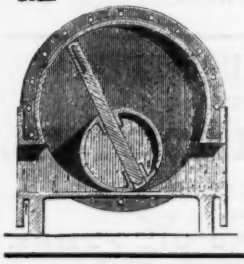

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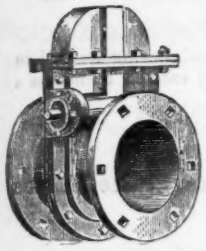

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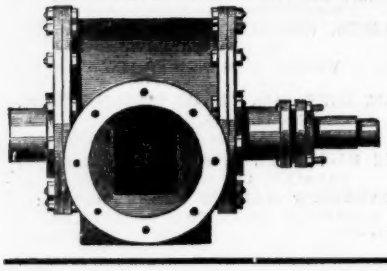

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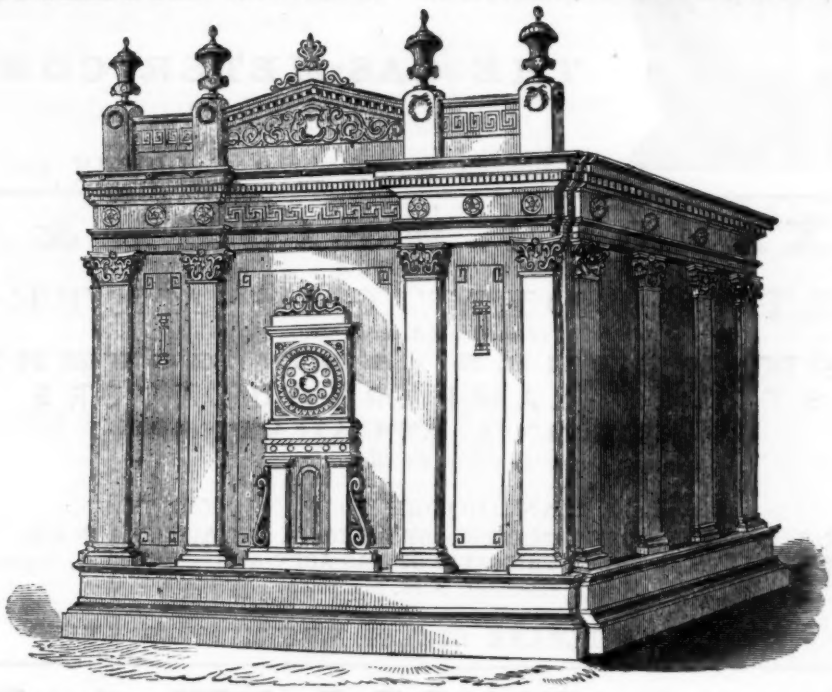

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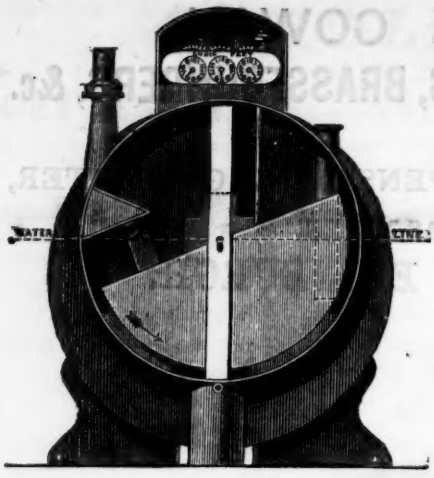

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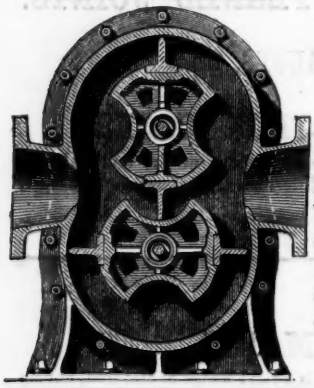

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